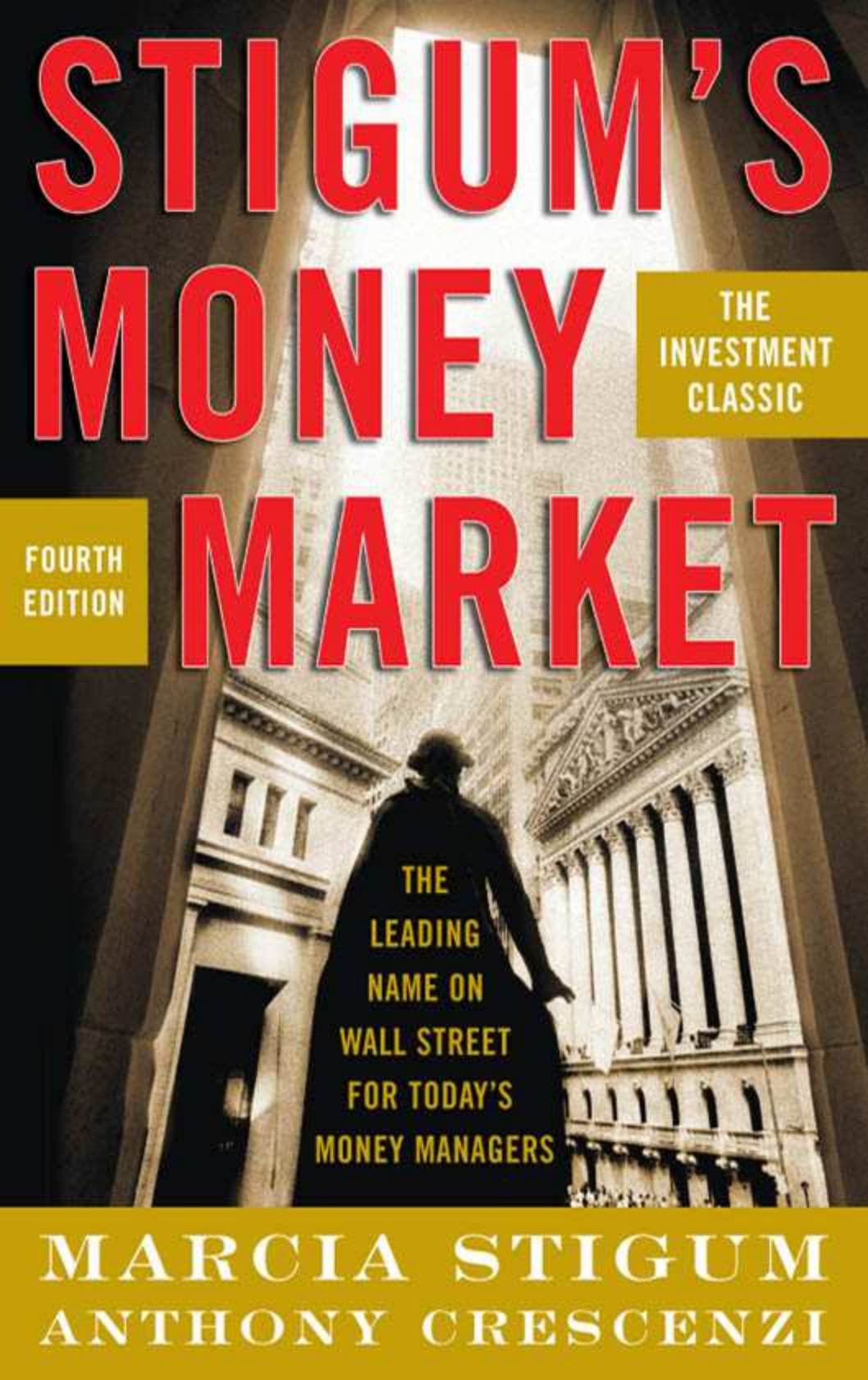




STIGUM'S MONEY MARKET

THE
INVESTMENT
CLASSIC

FOURTH
EDITION

THE
LEADING
NAME ON
WALL STREET
FOR TODAY'S
MONEY MANAGERS

MARCIA STIGUM
ANTHONY CRESCENZI

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STIGUM'S MONEY MARKET

FOURTH EDITION

**MARCIA STIGUM
ANTHONY CRESCENZI**

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*To the many market participants who gave, with
grace and enthusiasm, their time that I might
write this story*

Marcia Stigum

*To all the survivors, who despite obstacles and challenges in
their daily lives, each day find the inner strength to endure
and to excel*

*To my beautiful wife, Cynthia, and our enchanting daughters,
Brittany, Victoria, and Isabella*

*To my nurturing parents, Anita and Joseph, my brother Joseph
and my sisters Theresa, Gina, and Nicole, to all of my family and
friends, and to the great city of New York*

Anthony Crescenzi

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This book is a comprehensive guide to the money market—U.S. and Eurodollar. It is intended for people working in banks, in dealerships, and in other financial institutions; for people running liquidity portfolios; and for accountants, lawyers, students, and others who have an interest in the markets discussed.

The book begins with an introduction to what goes on in fixed-income financial markets—financial intermediation and money creation—plus an introduction to how fixed-income securities work, including various concepts of yield, the meaning and importance of the yield curve and the messages embedded in it, and the concepts and calculation of duration and convexity.

Next, the book analyzes the operations (domestic and Eurodollar) of money center banks, of money market dealers and brokers, of the Federal Reserve, and of managers of liquidity portfolios. In this section we detail the transformation of the industry from its bygone Glass-Steagall days. Then, with this background, the book turns to the individual markets that comprise the money market. For each such market—fed funds to interest-rate swaps—the book describes the instrument traded; its risks, liquidity, and return offered; its uses; and how the market for it is made by money market brokers, dealers, and investors. We also show how these markets have evolved to become what they are today.

Inevitably, the book presents an extensive description of the Eurodollar market; today, the Eurodollar market is always either an extension of or integrally related to the U.S. money market. Also, the interconnections between these two markets keep growing; for example, U.S. banks now obtain more of their funding from the Eurodollar market than they do from the fed funds market. Moreover, the transatlantic traffic in ideas, products, and trading techniques isn't unidirectional: forward rate agreements (FRAs), first traded in London, are now actively traded in New York, and London continues to be a magnet for cross-border flows.

Hallmarks of the money market are growth, change, and innovation. The money market, which seemed large and sophisticated when the first edition of this book was published in 1978, is, by 2006 standards, small

and a touch primitive. For example, in recent years a vast market for credit derivatives has been created, and we are left wondering: Why didn't someone see the possibilities earlier? This is a question that will likely be asked each time a new product or way of trading is introduced. Also, there is now much greater connectivity than ever before between brokers, banks, and investors, and in the payments systems that settle literally trillions of dollars of daily transactions in cash and securities. The commercial paper market, now twice the size of the Treasury bill market, is today used for a multitude of purposes and in a multitude of ways undreamed of in the past. And then there's a huge medium-term note (MTN) market, which, belying its name, has replaced a chunk of the traditional bond market. Bigger in impact has been the widespread use of derivatives, which is helping many money market participants to control risks. Banks, for example, actively use derivatives to manage their asset-liability risks.

No small part of the changes that have occurred and are occurring in the money market reflects the growing trend toward the deregulation and consolidation of national capital markets and the consequent globalization of these markets. Today, a portfolio manager who wants a government obligation has a choice of flavors: Treasuries, gilts, Bunds, OATs (French), or JGBs (Japanese government bonds) to name the most obvious. Some of the less obvious include obligations sold by entrants whose securities are now seen as more acceptable to own as an asset class. These include Russia, Latin America, and emerging Asia. Today, a corporate treasurer, a sovereign, or a global bank that needs to borrow has an array of choices: the institution can pick an advantageous currency and an advantageous rate, fixed or floating, at which to borrow and then swap the debt thus created for debt, fixed-rate or floating-rate, in the currency of its choice. And, of course, once the institution has learned to swap liabilities, swapping assets is the logical next step. Finally, as noted throughout the book, the use of financial futures and other derivatives, including Treasury and Eurodollar futures, has exploded in recent years; futures are used to arbitrage, to hedge, to position, and to just plain trade.

Many readers of this book will be relatively new to the money market. Part One provides background such readers will require for the rest of the text; it answers such questions as: What are the principal instruments in which the market deals? How do the major players in the market operate?

When this book was first written, almost all the material presented was based on interviews with market participants. Rather little was written about the money market, and almost nothing was written about how instruments in it are traded. An obvious reason is that the people most involved in and most expert in the market are action-oriented: they do it, they don't write about it. Much has changed. There is now an abundance of literature available, in part thanks to the 200 Ph.D.s at the Federal Reserve, who produce a large volume of in-depth work on a regular basis. In addition, the effort to harmonize both domestic and global financial systems has led to growth in the amount of research conducted by major organizations such as the Bank for International Settlements, further increasing the pool of available work that practitioners can draw from.

In every field, people develop special terms or give common terms special meanings in order to be able to communicate precisely and rapidly with one another, hence *jargon*. The money market is no exception, and this book uses money market jargon extensively. To aid the reader, each piece of jargon used is defined the first time it appears in the text; also, in the glossary at the end of the book a wide range of money and bond market terms are defined.

We use the pronouns *he* and *she* throughout this book, a change from the third edition of this book when only *he* was used. It is a reflection of our changed times—change itself is a key dynamic of the markets. Mathematical calculations have been kept to a minimum in this book. The reader who'd like to delve deeper into such topics is referred to Stigum's *Money Market Bond Calculations*.

In conclusion, I'd like to thank Alex Edmans from MIT, who authored Chapter 4 and collaborated with his MIT colleague Jack Bao on Chapter 17. I'd like to thank my employers, Jeffrey Miller and Jeffrey Tabak of Miller Tabak + Co., LLC, who have for many years given me the opportunity to explore the markets with great liberty, enabling me to gain insights into the intrigue of Wall Street.

Thanks also to the working men and women of our country. It is their work that is the driving force behind our economy and hence the flow of capital that drives the activities of the financial markets.

Stigum's Money Market became a classic because of the immensely exhaustive work of Marcia Stigum. No other book on its subject matter has come close to covering the ground that Stigum covered. I am honored to have the opportunity to revive this classic.

The now hundreds of people who, for this and previous editions, graciously took the time—often big chunks of it—to talk about what they do, how they do it, and why they do it are thanked in the acknowledgments that follow.

Anthony Crescenzi
New York, New York

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Before the advent of the information age, there was only one way that Marcia Stigum could have conducted her research for the earlier editions of this book. That was by interviewing at length participants in *every* area of the market: in New York, Chicago, London, Tokyo, and elsewhere. During the months she spent originally studying the market and subsequently reviewing it, everywhere Marcia Stigum went she received incredible cooperation. As Stigum put it, people freely gave her hours of time and discussed their operations frankly and articulately before sending her on to others elsewhere in the market.

In the earlier editions of *Stigum's Money Market*, Marcia Stigum extended her gratitude in this way:

To all of these people, I would like to express a very heartfelt thanks for the patient and thoughtful answers they proffered to my many questions. A particular thank you goes to those who volunteered to read and criticize those chapters that covered their area of specialty.

To those she thanked, I add a few of my own, but I would also like to especially acknowledge the work of the researchers at the Federal Reserve, where 200 Ph.D.s produce work available to the general public. The Fed's research can be of great value to anyone who endeavors to know more about the markets, the economy, the Fed, the banking sector, and much more. The Fed's work is easily accessed by subject matter via *Fed in Print*, found on the Internet. Excellent research is also available from the Bank for International Settlements, the International Monetary Fund, and the Federal Deposit Insurance Corporation.

The biggest acknowledgment of all goes to Marcia Stigum, whose immensely thorough work has stood the test of time. I am honored to have the opportunity to illuminate the rich content of *Stigum's Money Market*, which had been obscured only by the rapid changes that have occurred in the world of finance since the book's last edition.

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Introduction

The U.S. money market is a huge and significant part of the nation's financial system in which banks and other participants trade more than a trillion dollars every working day. Where those dollars go and the prices at which they are traded affect how the U.S. government finances its debt, how business finances its expansion, and how consumers choose to spend or save. Yet we read and hear little about this market, with most focusing on the intrigue of the stock market and fluctuations in the bond market. The conspiratorially minded might consider the money market's existence intentionally obscured. The reason most people are unaware of the money market is that it is a market that few businesspeople encounter in their daily activities and in which the general public turns to meet its ever-rising expectations on investment returns. Moreover, in an age in which attention spans have shrunk, there seems to be too little glamour in the money market to keep people tuned in to it.

The money market is a wholesale market for low-risk, highly liquid, short-term IOUs. It is a market for various sorts of debt securities rather than equities. The stock in trade of the market includes a large chunk of the U.S. Treasury's debt and federal agency securities, commercial paper, corporate securities, mortgage-backed securities, municipal securities, negotiable bank certificates of deposit, bank deposit notes, bankers' acceptances, and short-term participations in bank loans. Within the confines of the money market each day, banks—domestic and foreign—actively trade huge blocks and billions of dollars of federal funds and Eurodollars, the two main sources of overnight funds and the tools by which the Fed transmits its monetary policies. In addition, banks and nonbank dealers

are each day the recipients of billions of dollars of secured loans through what is called the “repo market,” which is now several trillion dollars in size. Today, a major feature of the money market is the derivatives market, where market participants go to hedge their risks and place bets associated with the gyrations in interest rates.

The heart of the activity in the money market occurs in the trading rooms of dealers and brokers of money market instruments, although increasingly the activity is occurring in cyberspace, over the Internet. During the time the market is open, these trading rooms are characterized by a frenzy of activity. Each trader or broker sits in front of a battery of direct phone lines that are linked to other dealers, brokers, and customers. Few phones ever ring, they just blink at a pace that makes, especially in the brokers’ market, for some of the shortest phone calls ever recorded. The Internet has reduced the need to transact over the phone, but with trading volume having increased dramatically, trading rooms seem as frenetic as ever, and dealing rooms are anything but quiet. Dealers and brokers know only one way to hang up on a direct-line phone; they BANG the off button. And the more hectic things get, the harder they bang. Banging phones like drums in a band beat the rhythm of the noise generated in a trading room. Almost drowning that banging out at times is the constant shouting of quotes and tidbits of information.

Unless one spends a lot of time in trading rooms, it’s hard to get a feel for what is going on amid all this hectic activity. Even listening in on phones is not very enlightening. One learns quickly that dealers and brokers often swear (it’s said to lessen the tension), but the rest of their conversation is unintelligible to the uninitiated. Money market people have their own jargon, and until one learns it, it is not easy to understand them. Luckily, this divide has crumbled a bit over the years, thanks to the information age and increases in market transparency and accessibility, even to the smallest of investors.

Once adjusted to their jargon and the speed at which traders converse, one observes that they are making huge trades—\$20 million, \$200 million, \$1 billion—at the snap of a finger. Moreover, nobody seems to be particularly awed or even impressed by the size of the figures. A fed funds broker asked to obtain \$100 million in overnight money for a bank might—nonchalant about the size of the trade—reply, “The buck’s yours from the San Fran Home Loan Bank,” slam down the phone, and take another call. Fed funds brokers earn less than \$1 per \$1 million on overnight funds, so it takes a lot of trades to pay the overhead and let everyone in the shop

make some money. Luckily for these brokers the volume of brokered transactions is between \$60 billion and \$80 billion per day.

Despite its frenzied and seemingly incoherent appearance to the outsider, the money market efficiently accomplishes vital functions every day. One is shifting vast sums of money between banks and other financial institutions. For banks, this shifting is required because many large banks, domestic and foreign, with the exception of very few, all need more funds than they obtain in deposits, whereas many smaller banks have more money deposited with them than they can profitably use internally.

The money market also provides a means by which the surplus funds of cash-rich corporations and other institutions can be funneled to banks, corporations, and other institutions that need short-term money. In addition, in the money market, the U.S. Treasury can fund huge quantities of debt with ease. And the market provides the Fed with an arena in which to implement its monetary policy. This is where the money market gets the most attention, with investors throughout the world focused almost obsessively with what the Fed might do next. New instruments such as fed funds futures now make it possible to pinpoint precisely what the money market expects of the Fed. The varied activities of money market participants also determine the structure of short-term interest rates, for example, what the yields on Treasury bills of different maturities are and how much commercial paper issuers have to pay to borrow. The latter rate is an important cost to many corporations, and it influences in particular the interest rate that a consumer who buys a car on time will have to pay on his loan. The commercial paper market is also one that tends to be overlooked, despite the fact that it is twice the size of the Treasury bill market. Finally, one might mention that the U.S. money market is increasingly becoming an international short-term capital market. In it oil imports, semiconductor purchases, aircraft, and a lot of other non-U.S. trade are financed.

Anyone who observes the money market soon picks out a number of salient features. First and most obvious, it is not one market but a collection of markets for several distinct and different instruments. What makes it possible to talk about *the* money market is the close interrelationships that link all these markets. A second salient feature is the numerous and varied cast of participants. Borrowers in the market include foreign and domestic banks, the U.S. Treasury, corporations of all types, the federal agencies such as Fannie Mae and Freddie Mac, Federal Home Loan Banks and other federal agencies, the financial arms of industrial corporations such as General Electric, dealers in money market instruments, and many

states and municipalities. The lenders include almost all of the above plus insurance companies, pension funds—public and private—and various other financial institutions, including the mutual fund industry. And, often, standing between borrower and lender is one or more of a varied collection of brokers and dealers.

Another key characteristic of the money market is that it is a wholesale market. Trades are big, and the people who make them are almost always dealing for the account of some substantial institution. Because of the sums involved, skill is of the utmost importance, and money market participants are skilled at what they do. In effect, the market is made up of extremely talented specialists in very narrow professional areas. A bill trader extraordinaire may have only vague notions of what the Eurodollar market is all about, and the Eurodollar specialist may be equally vague on other sectors of the market. Increasingly, however, more of today's trading desks are staffed with generalists, who deal in a wider variety of securities on a daily basis.

Another principal characteristic of the money market is honor. Every day traders, brokers, investors, and borrowers do billions of dollars' worth of business over the phone, and however a trade may appear in retrospect, people do not renege. It can be said that a motto of the money market, as in the fixed-income and foreign-exchange market, more generally is: *My word is my bond*. Of course, because of the pace of the markets, mistakes do occur, but no one ever assumes that they are intentional, and mistakes are always ironed out in what seems like the fairest way for all concerned.

One of the most appealing characteristics of the money market is innovation. Compared with our other financial markets, the money market is lightly regulated. If someone wants to launch a new instrument or to try brokering or dealing in existing instruments in a new way, he does it. And when the idea is good, which it often is, a new facet of the market is born. Moreover, the market is always changing. In the very final stages of the writing of this book, for example, the Chicago Mercantile Exchange was announcing its intention to buy the Chicago Board of Trade, merging two futures exchanges where the money market is prominently featured. Many more innovative changes undoubtedly lie ahead for the money market.

The focus of this book is threefold. First, attention is paid to the major players—who are they, why are they in the market, and what are they attempting to do? A second point of attention is on the individual markets—who is in each market, how and why do they participate in that market,

what is the role of brokers and dealers in that market, and how are prices there determined? The final focus is on the relationships that exist among the different sectors of the market, for example, the relationship of Eurodollar rates to U.S. rates, of Treasury bill rates to the fed funds rate, of the repo rate to the fed funds rate, and so on.

This book is organized in a manner to enable readers with different backgrounds to read about and understand the money market. Part One contains introductory material for readers who know relatively little about the market. It is preface and prologue to Parts Two and Three, which are the heart of the book. Thus, readers may skim or skip Part One depending on their background and interests. They are, however, warned that they do so at their own peril, since an understanding of its contents is essential for grasping subtleties presented later in the book. Readers needing to gain a quick sense of particular subject matter will find the charts, supporting text, and end-of-chapter reviews useful tools. The footnotes serve as a useful reference to readers wishing to delve into topics more deeply.

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PART ONE

Some Fundamentals

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Funds Flows, Banks, and Money Creation

As preface to a discussion of banking, a few words should be said about the U.S. capital market, how banks create money, and the Fed's role in controlling money creation. This will provide background for Chapters 6 and 7, which cover domestic and Eurobanking, and Chapter 9, where we examine in greater detail the Fed's role.

Roughly defined, the U.S. capital market is composed of three major parts: *the stock market*, *the bond market*, and *the money market*. The money market, as opposed to the bond market, is a wholesale market for high-quality, *short-term debt instruments*, or IOUs.

FUNDS FLOWS IN THE U.S. CAPITAL MARKET

Every spending unit in the economy—business firm, household, or government body—is constantly receiving and using funds. In particular, a business firm receives funds from the sale of output and uses funds to cover its costs of production (excluding depreciation) and its current investment in plant, equipment, and inventory. Historically, for most firms, *gross saving* from current operations (i.e., *retained earnings plus depreciation allowances*) has fallen far short of covering current capital expenditures; that is, net funds obtained from current operations are inadequate to pay capital expenditures. As a result, each year most nonfinancial business firms and the nonfinancial business sector as a whole have tended to run a large *funds deficit*. In the early 2000s, this pattern was upended, with most nonfinancial firms running large *funds surpluses*.

The actual figures rung up by nonfinancial business firms in 2005 are given in column 2 of Table 2.1. They show that business firms had retained earnings of \$383.5 billion (profits before tax of \$887.7 billion minus \$254.1 billion of taxes on corporate income and net dividends of \$250.1 billion) and their capital consumption allowances totaled \$636.0 billion, giving them (after a few other relatively small adjustments) a grand total of \$1.020 trillion of gross saving with which to finance capital expenditures. This amount, however, totaled \$926.9 billion, so the business sector as a whole incurred a \$93 billion funds surplus.

The surplus that nonfinancial businesses rang up in 2005 is highly unusual from a historical perspective, as the business sector tends to have a chronic funds deficit. The deficit is commonly known as the *corporate financing gap*, and it tends to run at close to 2% of the U.S. gross domestic product (GDP). This means that in 2005, with GDP at roughly \$13 trillion, a deficit of \$260 billion would have been considered normal. The funds surplus of 2005 was the second in a row for nonfinancial firms, which ran a surplus of \$78.9 billion the previous year. This is in stark contrast to 2000 when these firms ran a large deficit, owing largely to spending by entities earning little or no profits, particularly those that had used the capital that they had raised during the run-up in stock prices in the late 1990s. For example, there were many dot-com companies that were spending money that they would never earn, utilizing the proceeds from their initial public offerings.

Figure 2.1 shows the financing gap for all sectors. The chart indicates big swings between 2000 and 2006, moving from a large deficit to a large surplus.

There are many reasons why the nonfinancial sector moved to a funds surplus in the early 2000s, some of which are debatable. For example, some cite the large tax cuts enacted during those years, although there are many who would disagree. Another major influence was the bursting of the financial bubble in 2000. It instilled cautiousness among corporations, which became slower to hire and more restrained in their capital outlays. Such was the case until 2004 when both hiring and capital spending accelerated. Yet another reason relates to the secular trend begun in the early 1990s toward restructuring. Since that time, companies have been particularly keen to run themselves as leanly and efficiently as possible in order to boost profitability. Advances in technology, which contributed to the productivity boom that began in the mid-1990s, gave added momentum to the restructuring trend, boosting profitability and spurring funding surpluses in the process.

TABLE 2.1

The flow of funds in the U.S. capital market by sector at the end of 2005 (in billions of dollars)

Transaction Categories	Households	Nonfinancial Business	State and Local Government ^a	U.S. Governments ^a	Financial Business ^b	Rest of the World
1. Savings (net)	-42	384	3	-327	205	788
2. Depreciation ^c	1,228	636	0	0	0	0
3. Gross savings (1) + (2)	1,186	1,020	3	-327	205	788
4. Capital expenditures	1,712	927	0	0	234	0
5. Funds surplus or deficit (3) – (4)	-526	93	3	-327	-19	788
6. Net financial assets acquired	577	293	147	-16	313	1,154
7. Net financial liabilities incurred	1,186	278	173	308	319	359
8. Net financial investment (6) – (7) ^d	-609	15	-26	-324	-6	796
9. Sector discrepancy (5) – (8)	83	78	29	-3	-13	-8

^a Capital expenditures are included with current expenditures in U.S. and state and local government spending accounts.

^b The entries in lines 6 and 7 for this sector reflect the intersectoral and intrasectoral flow of funds that are funneled through financial institutions. The savings figure represents the current surplus for the sector. For this sector, gross savings are equal to capital consumption.

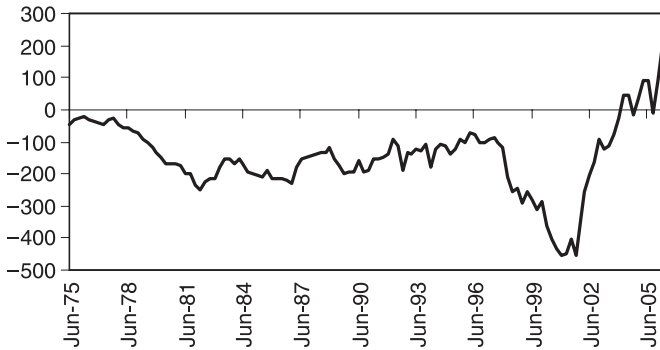
^c For the household sector, this figure includes net investments in consumer durables, consumption of fixed capital, and net capital transfers. For nonfinancial businesses, this figure includes an inventory valuation adjustment.

^d For state and local governments, this figure represents the increase in credit market instruments and excludes trade payables, which are shown in line 46 from Table F.105 of the Federal Reserve's Flow of Funds report.

Source: Federal Reserve

FIGURE 2.1

Corporate financing gap (corporate profits minus capital spending, in billions of dollars)—companies usually spend more than they earn, financing their expansion through the sale of stocks and bonds



Source: Federal Reserve

Whatever the causes of the funding surpluses, the surpluses reduced the nonfinancial sector's need to draw capital from other sectors. In other words, the business sector did not need to sell stocks, bonds, and money market instruments in order to fund its capital expenditures. That is why in 2005 the net amount of funds the business sector raised in the markets was a negative \$78.4 billion, resulting largely from a \$264.3 billion decrease in the amount of net new equity issues. Nonfinancial businesses nonetheless saw a net increase of \$280.3 billion in credit market instruments, including \$60.7 billion of corporate bonds.

Chronic deficits are more the norm for the business sector, which is to be expected, since every year the business sector receives a relatively small portion of total national income but yet has to finance a major share of national capital expenditures. Established business firms typically obtain relatively little new financing from the sale of new shares; the bulk of the funds they obtain to cover their deficits comes through the sale of bonds and money market instruments.

In contrast to the business sector, the consumer sector presents a quite different picture. As Table 2.1 shows, households in 2005 had gross savings of \$1.186 trillion yet made capital expenditures of \$1.712 trillion, leaving the sector with a *funds deficit* of \$526 billion. This funds deficit has been a persistent phenomenon in the early 2000s. Every year consumers as a group have been saving less than they have been investing in housing and

other capital goods. Consumers have been financing their investments mostly through home mortgages; household mortgage debt doubled between 2000 and the first quarter of 2006, increasing from \$4.4 trillion to \$8.9 trillion. With consumers running large funding deficits, it could be said that the business sector has been lucky that it hasn't had to depend upon the household sector to finance its capital expenditures. In past years, the consumer sector was a major supplier of funds to the business sector, which is to be expected in any developed economy in which the bulk of its investing is carried on outside the government sector. Households are, after all, the major income recipients, and business firms are the major investors.

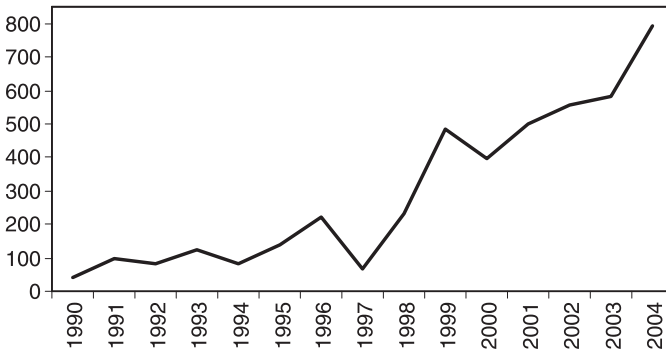
Consumers and nonfinancial business firms do not make up the whole economy. Two other sectors of major importance are the U.S. government and state and local governments. In neither of these sectors are capital expenditures separated from current expenditures. Thus, for each sector, the recorded funds deficit or funds surplus incurred over the year equals total revenue minus total expenditures, or *net saving*. Both sectors have run funds deficits in most recent years, with the result being that they compete with the household sector for the surplus funds generated in the business sector. This is what possible “crowding out” of business borrowers by government borrowing is all about.

For completeness, still another domestic sector must be added to the picture, *financial* business firms—banks, savings and loan associations, life insurance companies, and others. Most of the funds that these firms lend out to funds-deficit units are not funds of which they are the *ultimate* source. Instead, they are funds that these institutions have “borrowed” from funds-surplus units. If financial institutions only funneled funds from surplus to deficit units, we could omit them from our summary table. However, such activity is profitable, and every year financial firms accumulate gross savings, which exceed their modest capital expenditures, so net, the sector tends to be a *small* supplier of funds.

The final sector in Table 2.1 is the rest of the world, which in recent years has become the largest supplier of funds to domestic entities (Figure 2.2). Domestic firms cover some portion of the funds deficits they incur by borrowing abroad, and domestic funds-surplus units occasionally invest abroad, but they hardly provide enough funds to cover the large deficits run up by the household and government sectors. Thus, to get a complete picture of who supplies and demands funds, we must include the rest of the world in our summary table. Also, because of the large U.S. current account deficit, the central banks of the world are large holders

FIGURE 2.2

Net financial investment in the United States by foreign investors (in billions of dollars)



Source: U.S. Treasury

of dollars and they typically invest these dollars in U.S. government securities, thereby becoming financiers of the U.S. government debt. The deficit must be matched by an equally big net inflow of foreign capital as shown by the numbers in Table 2.1.

Every funds deficit has to be covered by the receipt of debt or equity capital from outside sources, and every funds surplus must be absorbed by supplying such capital. Thus, if the funds surpluses and deficits incurred by all sectors are totaled, their sum should be zero. Although the figures on the funds surpluses and deficits of Table 2.1 sum horizontally to zero, they don't always do so because of inevitable statistical errors. When this occurs, it indicates that some sectors' deficits have been overestimated and other sectors' surpluses underestimated. The net discrepancy, however, is usually small relative to various figures calculated for the major sectors, so in general the table presumably will give a good overall picture of the direction and magnitude of intersector funds flows within the economy.

Net Financial Investment by Sector

Funds flows between sectors leave a residue of *newly* created financial assets and liabilities. In particular, spending units that borrow incur claims against themselves which appear on their balance sheets as liabilities, while spending units that supply capital acquire financial assets in the form of stocks, bonds, and other securities.

This suggests that, since the consumer sector ran a \$526 billion funds deficit in 2005, the sector's holdings of financial assets should have decreased by a like amount over that year. Things, however, are not so simple. While the consumer sector as a whole ran a funds deficit, many spending units within the sector ran funds surpluses. Thus the appropriate figure to look at is the sector's *net financial investment*, that is, financial assets acquired minus liabilities incurred. For the household sector, this figure was \$577 billion in 2005, a healthy number but much smaller than the sector's funds deficit; the difference between the two figures is the result of the statistical errors that inevitably creep into such estimates. The Federal Reserve lists such discrepancies in the flow of funds tables, a tacit recognition of the errors that exist in its calculations.

The big funds surplus that the nonfinancial business sector ran up during 2005 indicates that the net rise in its financial assets outstanding over the year must have been substantial. The estimated figure confirms this, but again a discrepancy has crept into the picture.

Similar but smaller discrepancies exist between the funds surpluses or deficits run up by the other sectors as shown in Table 2.1 and their net financial investments, with the exception of the rest of the world, where the discrepancy fluctuated a great deal in the early 2000s.

FINANCIAL INTERMEDIARIES

As noted, every year large numbers of business firms and other spending units in the economy incur funds deficits that they cover by obtaining funds from spending units running funds surpluses. Some of this *external financing* involves what is called *direct finance*. In the case of direct finance, the *ultimate funds-deficit unit* (business firm, government body, or other spending unit) either borrows directly from *ultimate funds-surplus units* or sells equity claims against itself directly to such spending units. An example of direct finance would be a corporation covering a funds deficit by issuing new bonds, some of which are sold directly to consumers or to nonfinancial business firms that are running funds surpluses.

While examples of direct finance are easy to find, external financing more typically involves *indirect finance*. In that case, the funds flow from the surplus to the deficit unit via a *financial intermediary*. Banks, savings and loan associations, life insurance companies, pension funds, and mutual funds are all examples of financial intermediaries. As is apparent from this list, financial intermediaries differ widely in character. Nevertheless, they

all perform basically the same function. Every financial intermediary solicits and obtains funds from funds-surplus units by offering in exchange for funds “deposited” with it claims against itself. Such claims, which take many forms including demand deposits, time deposits, money market and other mutual fund shares, and the cash value of life insurance policies, are known as *indirect securities*. Financial intermediaries use the funds they receive in exchange for the indirect securities they issue to invest in stocks, bonds, and other securities issued by ultimate funds-deficit units, that is, *primary securities*.

All this sounds a touch harmless, so let’s look at a simple example of financial intermediation. Jones, a consumer, runs a \$20,000 funds surplus, which she receives in cash. She promptly deposits her cash in a demand deposit at a bank. Simultaneously, some other spending unit, say, the Alpha Company, runs a temporary funds deficit. Jones’s bank trades the funds Jones has deposited with it for a loan note (IOU) issued by Alpha. In doing this—accepting Jones’s deposit and acquiring the note—the bank is funneling funds from Jones, an ultimate funds-surplus unit, to Alpha, an ultimate funds-deficit unit; in other words, it is acting as a financial intermediary between Jones and this company.

Federal Reserve statistics on the assets and liabilities of different sectors in the economy show the importance of financial intermediation. In particular, at the beginning of 2006, households, personal trusts, and nonprofit organizations, who, as a group, have historically been the major suppliers of external financing, held \$35.4 trillion of financial assets. Of this total, \$7.0 trillion represented time and savings deposits at commercial banks, other thrift institutions, and money market funds; \$1.0 trillion, the cash value of their life insurance policies; \$11.1 trillion, the reserves backing pensions eventually due them; and \$4.5 trillion, mutual fund (other than money market) shares. Consumers also held \$5.7 trillion of corporate equities, \$864 billion of municipal securities, \$854 billion of corporate and foreign bonds, \$206 billion of U.S. savings bonds, \$321 billion of Treasury securities, and \$691 billion of agency- and GSE-backed securities. Thus the data show that over the years large amounts of money in consumer deposits have been channeled out of households running funds surpluses to other spending units through financial intermediation. The data also show that even larger amounts of monies have been channeled into the economy through the purchase of other financial assets.

Financial intermediaries are a varied group. To give some idea of the relative importance of different intermediaries, Table 2.2 lists the assets of

TABLE 2.2

Total financial assets held by major financial institutions at the beginning of 2006 (in billions of dollars)

Institutions	Assets
Commercial banking	9,527.7
Mutual funds	6,472.9
Private pension funds	4,875.7
Life insurance companies	4,478.7
Government-sponsored enterprises	2,828.5
Security brokers and dealers	2,295.9
State and local government retirement funds	2,173.5
Money market mutual funds	2,014.1
Funding corporations	1,963.3
Savings institutions	1,828.8
Finance companies	1,299.5
Property-casualty insurance companies	1,279.7
Federal government retirement funds	1,068.7
Federal Reserve Banks	871.6
Credit unions	702.6
Real estate investment trusts (REITs)	385.2

Source: Federal Reserve

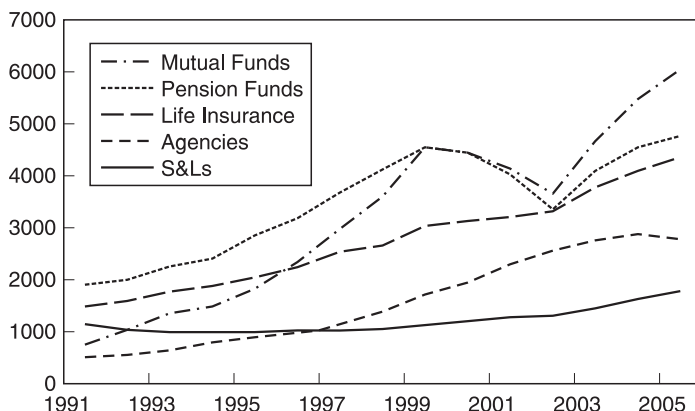
all the major intermediaries at the beginning of 2006. As one might expect, commercial banks are by far the most important intermediaries. An important development in recent years has been the increased role of mutual funds, pension funds, life insurance companies, and federally sponsored credit agencies, which each now hold more financial assets than savings and loan associations (S&Ls), a big change from 15 years prior when S&Ls were among the largest holders of financial assets (Figure 2.3).

The Reasons for Intermediation

The main reason for all the intermediation that occurs in our economy is that the mix of primary securities offered by funds-deficit units is unattractive to many funds-surplus units. With the exception particularly of corporate stocks and mutual funds, the minimum denominations on many primary securities are high relative to the size of the funds surpluses that most spending units are likely to run during any short-term period. Also, the amount of debt securities that deficit units want to borrow long

FIGURE 2.3

S&Ls are no longer near the top of the list of major holders of financial assets; mutual funds are now second to commercial banks (in billions of dollars)



Source: The Federal Reserve's Flow of Funds Accounts

term far exceeds the amount that surplus units—consumers and corporations that often desire high liquidity—choose to lend long term. This is particularly true of borrowers in emerging market countries that are able to obtain needed financing through banks willing to lend to riskier borrowers.¹ Finally, some risk is attached to many primary securities, more than most surplus units would like to bear.

The indirect securities offered to savers by financial intermediaries are quite attractive in contrast to primary securities. Many such instruments, for example, time deposits, have low to zero minimum denominations, are highly liquid, and expose the investor to negligible risk. Financial intermediaries are able to offer such attractive securities for several reasons. First, they pool the funds of many investors in a highly diversified portfolio, thereby reducing risk and overcoming the minimum denominations problem. Second, to the extent that one saver's withdrawal is likely to be met by another's deposit, intermediaries, such as banks and S&Ls, can with reasonable safety borrow short term from depositors and lend long term to borrowers. A final reason for intermediation is the tax advantages that

¹ Greg Nini, "The Value of Financial Intermediaries: Empirical Evidence from Syndicated Loans to Emerging Market Borrowers," Federal Reserve Board, *International Finance Discussion Papers*, September 2004.

some forms of intermediation, for example, participation in pension or 401(k) plans, offer individuals.

BANKS, A SPECIAL INTERMEDIARY

Despite the changes that have occurred over the years in the flow of funds, banks in our economy are an intermediary of special importance for several reasons. First, they are by far the largest intermediary; they receive huge quantities of *demand deposits* (i.e., checking account money) and time deposits, which they use to make loans to consumers, corporations, and others. Banks and thrifts are in fact the only entities allowed to offer checking accounts, as state and federal laws require that an entity hold a bank charter in order to offer checking accounts. Second, in the course of their lending activity, *banks create money*. The reason is that demand deposits, which are a bank liability, count as part of the money supply—no matter how one defines that supply, and although the focus on the aggregate growth in the money supply does not grab as much attention as it once did, the supply of money is immensely important in determining economic activity.

Just how banks create money takes a little explaining. We have to introduce a simple device known as a *T-account*, which shows, as the account below illustrates, the changes that occur in the assets and liabilities of a spending unit—consumer, firm, or financial institution—as the result of a specific economic transaction.

T-Account for a Spending Unit	
Changes in assets	Changes in liabilities

Consider again Jones, who takes \$20,000 in cash and deposits that money in the First National Bank. This transaction will result in the following changes in the balance sheets of Jones and her bank:

Jones		First National Bank	
Cash	−20,000	Reserves (cash)	+20,000
Demand deposits	+20,000	Demand deposits to Jones	+20,000

Clearly, Jones’s deposit results in \$20,000 of cash being *withdrawn from circulation* and put into bank (cash) reserves, but simultaneously \$20,000 of new demand deposits are created. Since every definition of the

money supply includes both demand deposits and currency *in circulation*, this deposit has no net effect on the size of the money supply; instead, it simply alters the composition of the money supply.

Now enters the Alpha Company, a funds-deficit unit, which borrows \$15,000 from the First National Bank. If the bank makes the loan by crediting \$15,000 to Alpha's account, changes will again occur in its balance sheet and in that of the borrower, too.

Alpha Company		First National Bank	
Demand deposits	+15,000	Loan to Alpha Co.	+15,000
		Demand deposits to Alpha Co.	+15,000

As the T-accounts show, the immediate effect of the loan is *to increase* total demand deposits by \$15,000, but no offsetting decrease has occurred in the amount of currency in circulation. Thus, by making the loan, the First National Bank has *created* \$15,000 of new money (Table 2.3).

The Alpha Company presumably borrows money to make a payment. That in no way alters the money-creation aspect of the bank loan. To illustrate, suppose Alpha makes a payment for \$15,000 to Beta Company by drawing a check against its new balance and depositing it in another bank, the Second National Bank. Then the following changes will occur in the balance sheets of these two banks:

Second National Bank		First National Bank	
Reserves (cash)	+15,000	Reserves (cash)	-15,000
Demand deposits to Beta Co.	+15,000	Demand deposits to Alpha Co.	-15,000

TABLE 2.3

Money supply

Step 1:	Jones holds \$20,000 in cash. Money supply equals: \$20,000 in cash
Step 2:	Jones deposits her \$20,000 of cash at the First National Bank. Money supply equals: \$20,000 of demand deposits held by Jones
Step 3:	The First National Bank lends \$15,000 to the Alpha Co. Money supply equals: \$20,000 of demand deposits held by Jones +15,000 of demand deposits held by Alpha Co. \$35,000 total money supply

The assumed payment merely switches \$5,000 of demand deposits and reserves from one bank to the other bank. The payment therefore does not alter the size of the money supply.

Bearing this in mind, let's now examine how the Fed regulates the volume of bank intermediation and what effect its actions have on the money supply and interest rates.

THE FEDERAL RESERVE'S ROLE

The Fed's life has been one of continuing evolution, first in determining what its goals should be and second in learning how to use the tools available to it to promote these goals. When Congress set up the Fed in 1913, it was intended to perform several functions of varying importance. First, the Fed was charged with treating an elastic supply of currency, that is, one that could be expanded and contracted in step with changes in the quantity of currency (as opposed to bank deposits) that the public desired to hold. Creating an elastic currency supply was viewed as important because, under the then existing banking system, when a prominent bank failed and nervous depositors at other banks began demanding currency for deposits, the banks were frequently unable to meet these demands. Consequently, on a number of occasions, the panic of 1907 being a case in point, currency runs on solvent banks forced these banks to temporarily suspend the conversion of deposits into cash. Such suspensions, during which currency traded at a premium relative to bank deposits, inconvenienced depositors and disrupted the economy.

The Fed was to solve this problem by standing ready during panics to extend to the banks at the discount window loans whose proceeds could be paid out in Federal Reserve notes. To the extent that the Fed fulfilled this function, it was acting as a lender of last resort, satiating the public's appetite for cash by monetizing bank assets. Today, acting as a lender of last resort remains an important Fed responsibility, but the Fed fulfills it in a different way.

Congress also intended that the Fed carry out a second and more important function, namely, regulating the overall supply of money and bank credit so that changes in them would promote rather than disrupt economic activity. This function, too, was to be accomplished at the discount window. According to the prevailing doctrine, changes in the money supply and bank credit would be beneficial if they matched the direction

and magnitude of changes in the economy's level of productive activity. Such beneficial changes in money and bank credit would, it was envisioned, occur semiautomatically with the Fed in operation. When business activity expanded, so, too, would the demand for bank loans. As growth of the demand for loans put pressure on bank reserves, banks would obtain additional reserves by rediscounting at the Fed (i.e., borrowing against *eligible paper*—notes, drafts, and bills of exchange arising out of actual commercial transactions. Conversely, when economic activity slackened, bank borrowing at the discount window, bank loans, and the money supply would contract in step.

Events never quite followed this smooth pattern, which in retrospect is not to be regretted. As theorists now realize, expanding money and bank credit without limit during an upswing and permitting them to contract without limit during a downswing, far from encouraging stable growth, would amplify fluctuations in income and output. In particular, unlimited money creation during a boom would fuel any inflationary fires and other excesses that developed.

Today, the Fed sees its major policy job as pursuing a *countercyclical monetary policy*. Specifically, it attempts to promote full employment and price stability by limiting the growth of bank intermediation when the economy expands too vigorously and by encouraging it when the economy slips into recession. To achieve these objectives, a stable predictive relationship between inflation and economic growth, often referred to as a *Phillips curve*, is necessary, according to many models.²

Controlling the Level of Bank Intermediation

The Fed has the ability to control the level of bank intermediation—the amount of bank lending and money creating—through several tools, although its main tool is its *open market operations*. One of the Fed's tools available to the Fed but which is rarely used is *reserve requirements*. Since the 1930s, the Fed has been responsible for setting the limits on the percentage of reserves that member banks are required to hold against deposits made with them. Under the Monetary Control Act of 1980, all depository

² Athanasios Orphanides and Simon van Norden, "The Reliability of Inflation Forecasts Based on Output Gap Estimates in Real Time," Federal Reserve Board, *Finance and Economics Discussion Series*, November 2004.

institutions, including commercial banks, S&Ls, credit unions, U.S. branches and agencies of foreign banks, Edge corporations, and agreement corporations. Required reserves must be held in the form of vault cash and, if vault cash is insufficient, also in the form of a deposit maintained with a Federal Reserve Bank. An institution that is a member of the Federal Reserve System must hold that deposit directly with a Reserve Bank; an institution that is not a member of the system can maintain that deposit directly with a Reserve Bank or with another institution in a pass-through relationship. Thus, each district Federal Reserve Bank acts in effect as a banker to commercial banks in its district, holding what amounts to checking accounts for them.

The existence at Federal Reserve Banks of member bank reserve accounts explains, by the way, how the Fed can clear checks drawn against one bank and deposited with another so easily. It does so simply by debiting the reserve account of the bank against which the check is drawn and crediting by an equal amount the reserve account of the bank at which the check is deposited.

The member banks' checking accounts also make it easy for the Fed to circulate currency in the form of Federal Reserve notes (a non-interest-bearing *indirect security* issued by the Fed). Currency runs on banks are a thing of the past, but the Fed must still constantly increase the amount of currency in circulation because, as the economy expands, more currency is needed by the public for ordinary transactions. Whenever people demand more currency, they demand it from their commercial banks, which in turn get it from the Fed by trading reserve deposits for currency. Since the Fed, as noted below, creates bank reserves by buying government securities, the currency component of our money supply is in effect created by the Fed through *monetization* of a portion of the federal debt. All this correctly suggests that the Fed, despite its lofty position at the pinnacle of the financial system, is none other than one more type of financial intermediary. In Chapters 9 and 12 we discuss reserve requirements in greater detail.

The second and most important tool of the Fed is its open market operations, that is, purchases and sales of government securities through which it creates and reduces member bank reserves. Whenever the Fed, operating through the trading desk of the Federal Reserve Bank of New York, buys government securities, its purchases inevitably increase bank reserves by an amount equal to the cost of the securities purchased. When the source of the securities purchased is a member bank, this result is obvious. Specifically, a purchase of \$10 million of government securities

would lead to the following changes in the balance sheets of the Fed and of a member bank:

The Fed				A Member Bank			
Government securities	+10MM	Member bank reserves	+10MM	Reserves	+10MM		
				Government securities	-10MM		

Even if the source of the government securities purchased by the Fed is a nonbank spending unit, the result will be essentially the same, since the money received by the seller, say, a nonbank dealer, will inevitably be deposited in a commercial bank, leading to the following balance sheet changes:

The Fed				A Member Bank			
Government securities	+10MM	Member bank reserves	+10MM	Reserves	+10MM	Deposits to nonbank seller	+10MM

A Nonbank Seller			
Government securities	-10MM		
Demand deposits	+10MM		

In the case of sales of government securities by the Fed, the process described above operates exactly in reverse, and member bank reserves are eliminated.

With the exception of loans extended by the Fed at the discount window (discussed below), the *only* way bank reserves can be created is through Fed purchases of government securities, and the only way they can be removed is through sales by the Fed of such securities.³ Thus, the Fed is in a position to control directly and precisely the quantity of reserves

³ There are some minor exceptions: In particular, movements of Treasury deposit balances between commercial banks and Fed banks affect member bank reserves, but the Fed tracks these movements daily and offsets them through purchases and sales of government securities. Seasonal and long-term changes in the public's demand for currency also affect bank reserves, but these changes too can be and are offset by the Fed through appropriate open market operations. Finally, under the current system of "dirty" or managed currency floats, cum outright intervention, U.S. and foreign central-bank operations in the foreign-exchange market may have some effect on domestic bank deposits.

available to the banking system. We discuss open market operations in greater detail in Chapter 9.

The Lid on Bank Intermediation

Taken together, reserve requirements and the Fed's ability to control the level of bank reserves permit the Fed to limit the level of intermediation in which banks may engage. Let's use a simple illustration. Suppose the Fed were to require banks to hold reserves equal to 10% of total deposits (the current rate for most deposits).⁴ If the Fed were then to create, say, \$90 billion of bank reserves, the maximum deposits banks could create through intermediation would be \$900 billion (10% of \$900 billion being \$90 billion).

Naturally, if the Fed were to increase bank reserves through open market purchases of government securities, that would increase the quantity of deposits banks could create, whereas open market sales by the Fed would do the reverse. For example, with a 10% reserve ratio, every \$1 billion of government security purchases by the Fed would permit a \$10 billion increase in bank assets and liabilities, whereas \$1 billion of sales would do the opposite.

Our example, which points up the potency of *open market operations* (purchases and sales by the Fed of government securities) as a tool for controlling the level of bank intermediation, is oversimplified. For one thing, the percentage of reserves that must be held by a bank against its deposits varies depending on the type of deposit and the size of the bank accepting the deposit. Thus, the actual amount of deposits (demand plus time) that a given quantity of reserves will support depends partly on the mix of deposits demanded by the public and partly on which depository institutions receive those deposits.

This, together with the fact that banks may choose not to fully utilize the reserves available to them, as well as the increased influence of nonbank financial firms, means that slack exists in the Fed's control over deposit creation. Nevertheless, open market operations are a powerful tool for controlling the level of bank activity, and they are used daily by the Fed to do so.

⁴ Reserve requirements actually vary depending upon the amount of net transactions accounts held at the depository institution. As of December 12, 2005, the first \$7.8 million of deposits were exempt from reserve requirements, and amounts between \$7.8 million and \$48.3 million were subject to a 3% reserve requirement. The amount of net transactions accounts subject to reserve requirements each year is set by statute under the Monetary Control Act.

The Ever-Closing Discount Window

As noted earlier, the founders of the Fed viewed discounting as its *key* tool. In practice, things have worked out differently. The main reason is that over time the Fed switched from controlling bank reserves through discounting to controlling them through open market operations. This switch makes sense for several reasons. First, it puts the Fed in the position of being able to take the initiative. Second, the size and liquidity of the market for government securities are such that the Fed can make substantial purchases and sales there without disrupting the market or causing more than negligible price changes. The latter is important because the Fed, to fine-tune bank reserves, must constantly be in the market buying and selling such securities. Part of this activity results from what is called the Fed's *defensive* operations, open market purchases and sales designed to counter the effect on bank reserves of outside forces, such as changes in currency in circulation and movements of Treasury balances between member banks and the Fed. In addition, the Fed undertakes open market operations to effect whatever overall changes in bank reserves are called for by current monetary policy.

The discount window still exists, and banks borrow there. This activity creates some slack in the Fed's control over bank reserves, so the Fed has to limit borrowing at the window. One way it does this is by charging a high penalty rate on discounts, one that discourages banks from borrowing except in cases of real and temporary need. The Fed began charging a penalty rate in 2003 when it changed its rules surrounding borrowing from its discount window. This was a change from previous years when the rate was typically set at a level in step with other money market rates, with the result that banks could at times profit by borrowing at the discount window and relending elsewhere. The new rules eliminate such arbitrage, helping the Fed to maintain its control over bank reserves. The Fed would rather have the discount window be seen by banks as a privilege they can use only sparingly and on a temporary basis.

Today, borrowing at the discount window represents a small element in the total reserves available to member banks. Following the rule changes in 2003, use of the discount window has fallen, with daily borrowing at just \$42 million per day in 2004 compared to \$1 billion per day during the period 1975 to 1990, representing a very small fraction of total bank reserves.

EXTENDING THE FED'S REACH

Holding non-interest-bearing reserve deposits at the Fed imposes an opportunity cost on a member institution, namely, the interest income forgone by the institution because it cannot use these deposits productively. During the 1960s and 1970s, high interest rate levels increased these opportunity costs, spurring many banks to leave the Federal Reserve System, since at that time only member banks were subject to reserve requirements.⁵

The Fed viewed this trend with alarm. It was prepared to live with a situation in which many small state banks were not members. However, the Fed feared that the exit from the system of increasingly more and increasingly larger banks would decrease the effectiveness of its policies and, in particular, limit its ability to control the money supply. As a result, the Fed from 1964 onward urged Congress to amend the Federal Reserve Act to make nonmember banks subject to the same reserve requirements as member banks. A second smaller but growing problem faced by the Fed at that time was that thrift institutions outside its control began to issue *NOW* (*negotiable order of withdrawal*) accounts. Deposits in such accounts amount, in effect, to interest-bearing demand deposits and as such are *money* by any reasonable definition.

In 1980, Congress passed the landmark *Depository Institutions Deregulation and Monetary Control Act*. One objective of this wide-ranging act was to increase the Fed's control over money creation. To this end, the act, dubbed the *Banking Act of 1980*, called for the Fed to impose, over a phase-in period, reserve requirements on nonmember banks and on thrift institutions offering checking accounts, as well. At the same time, reserve requirements on savings and time deposits held by individuals at all depository institutions were to be eliminated. (This act was to some extent amended and superseded by the Banking Act of 1982, which sped up rate deregulation.)

As a quid pro quo for the new reserve requirements, the 1980 act empowered banks and all other depository institutions to issue *NOW* accounts. It also empowered thrift institutions to make a wider range of investments and granted them access to the discount window.

⁵ At that time, nationally chartered banks were required to become members of the Federal Reserve System, but state chartered banks were not.

Full implementation of the 1980 act further blurred the once clear line of demarcation between commercial banks and thrifts.

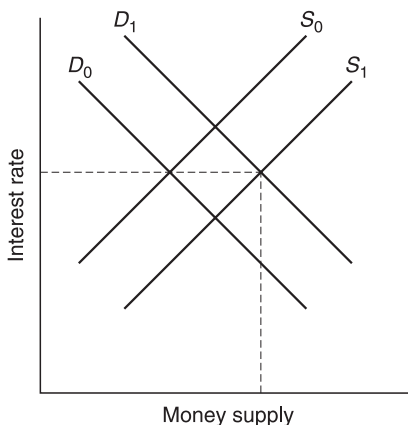
Money Supply and Fed Control over It

As is explained in Chapter 3, banks borrow and lend excess reserves to one another in the *federal funds market*. The rate at which such lending and borrowing occurs is called the *fed funds rate*. When the Fed cuts back on the growth of bank reserves, this tightens the supply of reserves available to the banking system relative to its demand for them; that, in turn, drives up the fed funds rate, which, in turn, drives up other short-term interest rates. Thus, any easing or tightening by the Fed necessarily alters not only money supply growth, but interest rates as well.

Because of this, the Fed cannot have two independent policies, one to control money supply growth and a second to influence interest rates. If the Fed focuses on pegging interest rates, money supply becomes a residual variable; it is what it is and falls outside the control of the Fed. Conversely, a Fed decision to strictly control money supply growth implies a loss by the Fed of its ability to independently influence the level of interest rates. (See Figure 2.4.)

FIGURE 2.4

When targeting interest rates, the Fed relinquishes control of the money supply (D = demand for money; S = supply of money)



In implementing monetary policy, the Fed in the early 1970s focused primarily on interest rates and more particularly on the fed funds rate. The Fed viewed money as tight if interest rates were high or rising, as easy if interest rates were low or falling. This policy stance was predicated on the view that high and rising interest rates would discourage spending and the expansion of economic activity, while low or falling rates would do the reverse.

The monetarists, with Milton Friedman at the fore, argued that this analysis was incorrect. According to their theory, giving people more money causes them to increase their spending on goods and services. Therefore, the key to achieving steady economic growth and to controlling inflation is a monetary policy that holds the rate of growth of the money supply strictly in line with the rate of growth of real output achievable by the economy. The clear implication of the monetarist position is that the Fed should seek to peg not the Fed rate but the rate of growth of money.

Gradually, grudgingly, and with a prod from Congress in the form of the Humphrey-Hawkins bill passed in 1978, the Fed accepted (or said it did) the monetarist doctrine and shifted the focus of its policy from controlling interest rates to controlling money supply growth, the policy shift being implemented under Fed Chairman Paul Volcker.

The focus on controlling money supply growth began to wane in the late 1980s, when the Fed began an interest-rate targeting regime that continues to this day. Interestingly, even though the Fed had begun to issue policy statements consistent with a desire to reflect interest-rate changes in quarter-point increments as early as 1989, the Fed did not begin to announce changes it made in the fed funds rate on the day it was made until 1994, and the Fed did not reference the amount of its rate changes until July 1995.

Figure 2.5 illustrates the lack of specificity that once accompanied the Fed's policy statements, even as late as 1994, five years after the apparent shift to interest-rate targeting. As Figure 2.5 shows, the Fed's half-point increase in the fed funds rate was not explicitly stated. Although the Fed announced that it was increasing the discount rate by 50 basis points, its reference to the fed funds rate was rather vague by today's standard.

Pitfalls of Monetarism

For monetarists, particularly those residing in the ivory towers of academe, it appeared years ago that the mandate to strictly control the growth

FIGURE 2.5

The Fed's not-so-direct announcement of a 50 basis point hike in the fed funds rate in May 1994

Federal Reserve Release

Press Release



Release Date: May 17, 1994

The Federal Reserve announced on May 17, 1994, two actions designed to maintain favorable trends in inflation and thereby sustain the economic expansion.

The Board approved an increase in the discount rate from 3 percent to 3½ percent, effective immediately, and the Federal Open Market Committee (FOMC) agreed that this increase should be allowed to show through completely into interest rates in reserve markets.

These actions, combined with the three adjustments initiated earlier this year by the FOMC, substantially remove the degree of monetary accommodation that prevailed throughout 1993. As always, the Federal Reserve will continue to monitor economic and financial developments to judge the appropriate stance of monetary policy.

In taking the discount action, the Board approved requests submitted by the boards of directors of eleven Federal Reserve Banks—Boston, New York, Philadelphia, Richmond, Atlanta, Chicago, St. Louis, Minneapolis, Kansas City, Dallas, and San Francisco. On May 18, the Board approved an action by the board of directors of the Federal Reserve Bank of Cleveland, increasing the discount rate of that bank from 3 percent to 3½ percent. The discount rate is the interest rate that is charged depository institutions when they borrow from their District Federal Reserve Bank.

of the money supply is one that the Fed could carry out with reasonable ease and a high degree of precision. In practice, however, the policy of controlling money supply growth—whether wise or foolish—posed serious problems for the Fed.

The first, and hardly trivial, problem facing the Fed was to determine just what money is. Clearly, the old definition of money, demand deposits plus currency in circulation, is too restrictive given the advent of new types of deposit accounts—NOW accounts, ATS (automatic transfer from savings to demand deposit) accounts, and “sweep accounts” (automatic transfer from demand deposits to money market deposit accounts)—that could be used for transactions purposes, but a host of other highly liquid investment options, including direct placements in *money market funds*. Since liquidity is measured in degrees, drawing a line between money and near monies necessarily involves *arbitrary* choices. This being the case, the Fed found

itself struggling for some time simply to define what it was that it was supposed to control, and during the Greenspan years it lost trust in the predictive value of the money supply. This is readily apparent in the Fed’s decision in March 2006 to cease publication of the M3 monetary aggregate. The Fed explained in its press release announcing the decision that “M3 does not appear to convey any additional information about economic activity that is not already embodied in M2 and has not played a role in the monetary policy process for many years. Consequently, the Board judged that the costs of collecting the underlying data and publishing M3 outweigh the benefits.”

The Fed’s difficulties in defining money are reflected in its decision to publish several different measures of money supply (Table 2.4) and in the many changes in its definitions (see Chapter 9). Obviously, the Fed cannot independently control the growth of each of these aggregates. It currently focuses its attention primarily on M1 and M2, although “attention” is probably too strong a word.

TABLE 2.4

The Fed’s measures of the money supply, August 2006

M1:	M1 consists of (1) currency outside the U.S. Treasury, Federal Reserve Banks, and the vaults of depository institutions; (2) traveler’s checks of nonbank issuers; (3) demand deposits at commercial banks (excluding those amounts held by depository institutions, the U.S. government, and foreign banks and official institutions) less cash items in the process of collection and Federal Reserve float; and (4) other checkable deposits (OCDs), consisting of negotiable order of withdrawal (NOW) and automatic transfer service (ATS) accounts at depository institutions, credit union share draft accounts, and demand deposits at thrift institutions. Seasonally adjusted M1 is constructed by summing currency, traveler’s checks, demand deposits, and OCDs, each seasonally adjusted separately.
M2:	M2 consists of M1 plus (1) savings deposits (including money market deposit accounts); (2) small-denomination time deposits (time deposits in amounts of less than \$100,000), less individual retirement account (IRA) and Keogh balances at depository institutions; and (3) balances in retail money market mutual funds, less IRA and Keogh balances at money market mutual funds. Seasonally adjusted M2 is constructed by summing savings deposits, small-denomination time deposits, and retail money funds, each seasonally adjusted separately, and adding this result to seasonally adjusted M1.
M3:	Series discontinued by the Federal Reserve effective March 23, 2006.

Source: Federal Reserve

Some History on the Downside of Monetarism

In late 1982 and early 1983, the Fed found that the problem of defining money supply went from being difficult to nigh impossible, opening up, as some saw it, “a can of worms.” The immediate cause of the problems faced by the Fed, as 1982 became 1983, lay in the Banking Act of 1982. One of its provisions was a mandate to the Depository Institutions Deregulation Committee (DIDC) that this committee design within 60 days an interest-rate lid-free account to be offered by banks and thrifts that would permit these institutions to compete on equal terms for deposits with money funds.

The DIDC came up with, to the surprise of many observers, not one but two new accounts. The first, called the *money market deposit account (MMDA)*, required the depositor, private or corporate, to maintain a minimum balance of \$2,500 (subsequently eliminated); in exchange the depositor obtained a federally insured account on which she could write three checks and make three preauthorized withdrawals per month and on which the deposit-accepting institution could pay any rate it wished. The Fed chose to view this account as more akin to a savings than a demand deposit account and included it in M2.

The introduction of MMDAs on December 14, 1982, was followed by the introduction of *Super-NOW accounts* on January 5, 1983. These accounts, which initially at least were available only to individuals, also required the depositor to maintain a minimum balance of \$2,500 (later eliminated); in exchange, the depositor obtained a federally insured checking account on which she could make unlimited withdrawals and on which the deposit-accepting institution could pay any rate and impose any service charges it wished. Today, there is no real distinction between NOW and Super-NOW accounts. The Fed includes Super-NOW accounts in M1.

The introduction of MMDAs and Super-NOW accounts made measuring money supply more difficult than ever for the Fed because it blurred even further, if possible, the distinction between instruments in which people hold transactions balances and instruments in which they hold savings. MMDAs were an immediate success and in the early weeks of their existence were drawing several billions of dollars per week from money funds, whose deposits are counted in M2. The new MMDA accounts were also drawing billions of dollars of deposits out of old lower-yielding accounts at banks and thrifts. All this shifting of balances from place to place combined with the introduction of the new accounts made it impossible

for the Fed—for a period at least—to interpret the meaning of the growth rates of M1 and M2. Responding to this, the Fed suspended its use of M1 as a guide in policy making and declared that henceforth it would be guided by M2; in fact, however, it permitted M2 to grow at out-of-bounds rates without responding by tightening. Whatever the Fed said it was doing, it appeared that the Fed by 1983 was backsliding from a monetarist policy of controlling money supply to its former policy of controlling interest rates.

Defining money, while a tough nut to crack, is only the beginning of the Fed's problems in controlling money supply. A second, equally intractable and, from a policy point of view, equally serious problem is that a large erratic element appears to be intrinsic in money supply behavior with the result that week-to-week money supply figures often reflect special factors unrelated to economic activity. For example, in a 2005 Fed study, fluctuations in the amount of mortgage refinancing activity were found to affect the behavior of M2.⁶

In accepting and seeking to implement a strictly monetarist policy, the Fed—as had to be the case—lost control over interest rates. This permitted rates to take off on a roller coaster ride. It also created a situation in which strong reactions by money and bond market traders to weekly money supply figures made interest rates highly volatile and unpredictable, even on a week-to-week basis. Reports of strong growth in the money supply spurred decreases in market interest rates, and weak growth spurred increases in rates.

The price of a monetarist policy in a highly inflationary economy was an extremely high degree of uncertainty with respect to rates in the capital market. This untoward consequence of monetarism could hardly be viewed as contributing to economic stability. The Fed knew this and wanted to feed to credit market participants money-supply numbers that delineated longer-term trends in monetary growth. Unfortunately, it could find no way to do so.

As the meaning of Fed numbers on money supply became increasingly unclear, the Fed used this as an excuse to retreat from outright monetarism—to disregard, “temporarily” it said, money-supply figures in making policy. Today, the Fed no longer sets monetary goals. The Humphrey-Hawkins act that once required the Fed to set its monetary

⁶ Yueh-Yun C. O'Brien, “The Effects of Mortgage Prepayments on M2,” *Finance and Economics Discussion Series*, Federal Reserve Board, September 2005.

goals is now defunct, having expired in May 2000. In its place, the Fed has gone back to pegging the funds rate and nudging it up or down when it wants to adjust its monetary policy.

REVIEW IN BRIEF

- In order to understand banking, it is important to have a grasp of funds flows in the capital markets, how banks create money, and the Fed's role in controlling money creation.
- Every spending unit in the economy is constantly receiving and using funds, with some entities running *funds surpluses*, which finance the *funds deficits* of other entities.
- Historically, households have been the major supplier of funds, channeling their funds to the business sector. In the early 2000s, their roles reversed, and foreign investors took the top spot.
- The funds surplus run by the business sector in the early 2000s is highly unusual from a historical perspective; businesses tend to have a *financing gap*.
- Every funds deficit has to be covered by the receipt of debt or equity capital from outside sources, and every funds surplus must be absorbed by supplying such capital.
- Some entities obtain funding through *direct finance*; others through *indirect financing* via *financial intermediaries*. Banks, savings and loan associations, life insurance companies, pension funds, and mutual funds are all examples of financial intermediaries.
- Banks in the U.S. economy are an intermediary of special importance for several reasons. For example, banks are by far the largest intermediary and in the course of their lending *create money*.
- The Federal Reserve's role in money creation is substantial, and it continues to evolve. Congress initially intended that the Fed regulate the overall supply of money and bank credit when it established the Fed in 1913. Use of the *discount window* was a key tool of the Fed.
- Over the years, the Fed has varied its modus operandi for its implementation of monetary policy, switching between reserve-

targeting and interest-rate targeting regimes, settling on interest-rate targeting in the late 1980s.

- In an interest-rate targeting regime, the Fed essentially forgoes its control over the money supply.
- Today, the Fed sees its major policy job as pursuing a *countercyclical monetary policy*, applying monetary restraint when the economy is growing too strong and providing accommodation when it is growing at an undesirably slow pace. The Fed's main tool in this respect is the Fed's *open market operations*.

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The Instruments in Brief

Here's a quick rundown of the major money market instruments. Don't look for subtleties; just enough is said to lay the groundwork for later chapters.

DEALERS AND BROKERS

The markets for all money market instruments are made in part by brokers and dealers. *Brokers* bring buyers and sellers together for a commission. By definition, brokers never position securities. Their function is to provide a communications network that links market participants who are often numerous and geographically dispersed. Most brokering in the money market occurs between banks that are buying funds from or selling funds to each other and between dealers in money market instruments.

Dealers make markets in money market instruments by quoting—to each other, to issuers, and to investors—bid and asked prices at which they are prepared to buy and sell. Whenever a dealer trades securities, he is acting as *principal*, that is, he trades for his own account; thus, assuming positions—long and short—is an essential part of dealing. Naturally, when a dealer goes long or short, he hopes to profit: to later *sell* at a *higher* price securities he goes *long*, and to later *buy* at a *lower* price securities he *shorts*.

Dealers also act as *agent* in the issuance of commercial paper and medium-term notes (MTNs), including bank deposit notes. To say that a

dealer acts as an agent in the issuance of new paper means that, through his distribution network, he sells to investors for a *fee* (or commission) new paper that an issuer wants distributed. In this case, the dealer is representing the issuer rather than dealing with the issuer as principal. Like a broker, a dealer acting strictly as agent does not position. It is, however, not unusual for a dealer to act both as agent and principal in the same market. For example, a dealer will typically act as an agent in distributing MTNs, that is, in the *new-issue market* for MTNs, but as principal when, to provide market liquidity, he makes bids for and offers of outstanding MTNs. A market in which outstanding issues are traded is referred to as a *secondary market*.

U.S. TREASURY SECURITIES

To finance the U.S. national debt, the Treasury issues several types of securities. Some are nonnegotiable; for example, savings bonds sold to consumers and special issues sold to government trust funds. The bulk of the securities sold by the U.S. Treasury are, however, negotiable.

What form these securities take depends on their maturity. Those with a maturity at issue of a year or less are known as *Treasury bills*, *T-bills* for short or just plain *bills*. T-bills bear no interest. An investor in bills earns a return because bills are issued at a discount from face value and redeemed by the Treasury at maturity for face value. The amount of the discount at which investors buy bills and the length of time bills have to be held before they mature together imply some specific yield that the bill will return if held to maturity.

T-bills are currently issued in 4-week, 3-month, and 6-month maturities.¹ In issuing bills, the Treasury does not set the amount of the discount. Instead, the Federal Reserve is authorized by the Treasury to act as fiscal agent of the United States and hence auctions each new bill issue to investors and dealers, with the bills going to those bidders offering the highest price, that is, the lowest interest cost to the Treasury. By auctioning new bill issues, the Treasury lets currently prevailing market conditions establish the yield at which each new issue is sold.

¹ For tactical debt management purposes, the Treasury occasionally meets cash flow gaps by issuing very short-term “cash management bills,” consisting sometimes of bills maturing in just a few days.

The Treasury also issues interest-bearing *notes*. These securities are issued at or very near face value and are redeemed at face value. Notes have an *original maturity* (maturity at issue) of 2 to 10 years.² Currently, the Treasury issues 2-, 3-, 5-, and 10-year notes on a regular cycle. Interest on Treasury notes is paid semiannually. Notes, like bills, are sold through auctions held by the Federal Reserve. In these auctions, participants bid yields, and the securities offered are sold to those dealers and investors who bid the lowest yields, that is, the lowest interest cost to the Treasury. These days, the Treasury conducts “Dutch” auctions, which are also known as “single-price” auctions, wherein all bidders are awarded the same price—the highest yield required to sell the entire amount offered. Thus, the coupon rate on new Treasury notes, like the yield on bills, is determined by the market.

Until August 2001, the Treasury also issued interest-bearing negotiable *bonds*, with a maturity at issue of 30 years. The Treasury resumed issuance of 30-year bonds in February 2006. The only difference between Treasury notes and bonds is that bonds are issued in longer maturities. Treasury bonds, like notes, are normally sold at yield auctions.

Banks, other financial institutions, insurance companies, pension funds, and corporations are all important investors in U.S. Treasury securities. More important these days are foreign central banks and foreign institutions, which own close to half of all publicly traded Treasury securities. Individual investors play only a small role in the Treasury market, with direct holdings of only about 8% of all publicly traded Treasuries. The market for government securities is largely a wholesale market, and especially at the short end, multimillion-dollar transactions are common. In fact, the daily volume in U.S. Treasury securities runs about \$600 billion per day. On the Street, most trading desks view transactions smaller than \$1 million as “odd lots.”

Because of the large amount of Treasury debt outstanding and other factors described below, the market for bills and short-term government securities is the most active and most carefully watched sector of the money market. At the heart of this market stands a varied collection of dealers who make the market for *governments* (market jargon for government securities) by standing ready to buy and sell huge volumes of these securities.

² A 5-year note has an *original maturity* at issue of five years. One year after issue, it has a *current maturity* of four years.

These dealers trade actively not only with investors, but with each other. Most trades of the latter sort are carried out through brokers.

Governments offer investors several advantages. First, because they are constantly traded in the *secondary market* in large volume and at narrow spreads between the bid and asked prices, they are highly *liquid*. Second, governments are considered to be free from credit risk because it is inconceivable that the government would default on them. Third, interest income on governments is exempt from state taxation. Fourth, because the U.S. dollar remains the reserve currency in the global financial system, the Treasury market is truly a global market. Because of these advantages, bills and governments having a short current maturity normally trade at yields below those of other money market instruments.

Generally, yields on governments are higher the longer their *current maturity*, that is, time left to maturity. The reason, explained in Chapter 4, is that the longer the current maturity of a debt security, the more its price will fluctuate in response to changes in interest rates and therefore the greater the *price risk* to which it exposes the investor. There are times, however, when the yield curve *inverts*, that is, yields on short-term securities rise above those on long-term securities. This, for example, was the case during much of the period 1979 to 1981, in early 1989, and again in early 2000—all periods that preceded economic recessions. In 2006 the yield curve had inverted again, but recession was not on the horizon. The reason for an inverted yield curve is that market participants anticipate, correctly or incorrectly, that interest rates will fall. As a result, borrowers choose to borrow short term while investors seek out long-term securities; the result is that supply and demand force short-term rates above long-term rates.

30-Year Bills, Alias STRIPS

In the 1980s the Treasury permitted the creation, out of standard T-bonds, of what amount to T-bills with distant maturities. Here's the story.

The Treasury once issued, upon request, notes and bonds in bearer form. Some dealers came up with the idea of *stripping*—clipping off coupons from—bearer bonds and selling, at discounted prices, the resulting pieces. Each such piece was a *non-interest-bearing security with a fixed maturity and a fixed value at maturity*. Such securities are known generically as *zero-coupon securities*, or simply as *zeros*.

Dealers could make money stripping bearer Treasuries because demand for the pieces was so great that the sum of the values of the pieces exceeded

the value of the whole bond. Unfortunately, the Treasury and the Fed opposed, for various reasons (including possibilities for tax evasion), the stripping of bearer Treasuries, and the issuance of bearer Treasuries was eliminated beginning in 1983.

To satisfy investors' desire for long-term zeros, Merrill got a bright idea: It bought Treasuries, placed them with a custodian in a special trust, and then sold to investors participations in its trust. Under the Merrill plan, each such participation sold was a *zero-coupon security*, backed by unstripped Treasuries. Merrill named its product TIGRs. Soon, every other major dealer was offering its addition to the zoo. Sali sold CATs; Lehman, LIONs; and so on. Also, some dealers sold plain vanilla TRs (trust receipts).

The new "zoo" zeros sold extremely well to institutional investors and even to individuals. The Treasury, eyeing this success, said, "There's money to be made in stripping, let *us* earn it." So in 1985, the Treasury introduced, for certain new T-bond issues, an additional feature: any owner of such a bond—Merrill, a small dealer, or even an individual—can ask the Treasury to cut that bond into pieces, provided it is in book-entry (electronic) form. Each such piece corresponds to a different payment due on the bond, and each carries its own CUSIP (ID) number.³ On a 10-year note, there are 21 such payments: 20 semiannual interest payments and 1 payment of *corpus* (principal) at maturity. Stripped Treasuries created in the manner just described were dubbed *STRIPS*, the short name for Separate Trading of Registered Interest and Principal of Securities. STRIPS eventually supplanted "zoo" zeros as the most popular form of zero-coupon bond.

Today on Wall Street, STRIPS remain popular and are actively traded by the same dealers who make markets in regular Treasury notes, bonds, and bills. A market has not yet fully developed for stripped components of TIPS (Treasury Inflation-Protected Securities), which were first issued in 1997. Roughly \$151 billion in STRIPS were outstanding as

³ CUSIP is an acronym for the *Committee on Uniform Securities Identification Procedures*.

The CUSIP number is used to identify most securities, including stocks of all registered U.S. and Canadian companies, and U.S. government, municipal, and corporate bonds.

These numbers are assigned, for a fee, by Standard & Poor's. All interest STRIPS that are payable on the same day, even when stripped from different securities, have the same generic CUSIP number. However, the principal STRIPS from each note or bond have a unique CUSIP number.

of May 2006, a bit less than existed on average in 2004 (the data are compiled monthly by the U.S. Treasury Department).

STRIPS are especially popular with investors who want to receive a specific payment amount at a specified date in the future. Examples of such include state lotteries and pension funds. STRIPS are also popular investments for individual retirement accounts, 401(k) plans, and other investment income tax-advantaged accounts.

Internationalization of the Market for Treasuries

Twenty-five years ago, when one spoke of *the* market for Treasuries, one was referring to a market that was almost exclusively domestic. The borrower, of course, was domestic and so too were most of the investors, except for a few foreign central banks. Today, that situation has changed dramatically. Foreigners, and most importantly Asian investors, have become big buyers of Treasury securities.

Not surprisingly, there are now active markets for Treasuries throughout the world. Today, reflecting in part the fact that foreigners currently own close to 50% of the roughly \$4 trillion in outstanding marketable Treasuries, the market for these securities has in truth become a 24-hour, global market.

The dealers who make up this round-the-globe market are of two sorts: big American dealers, such as Merrill, Lehman, and Goldman, and also foreign dealers, such as Japanese dealers, who have opened offices in the United States and have become a big factor in the domestic trading of Treasury securities. Among foreign investors, Japanese investors hold the most Treasuries, with \$673 billion in holdings as of February 2006. China, whose influence has steadily increased, held \$265 billion as of February 2006. The persistent rise in foreign ownership of U.S. Treasuries has worried some market observers who are concerned that the United States might be too heavily dependent upon foreign capital to finance its budget and trade deficits. Others say that for a variety of reasons foreign investors will likely stick with Treasuries for years to come and that, if anything, the influx of foreign capital into the United States is beneficial to the U.S. financial markets and hence the economy.

Financial Futures

In discussing the market for governments, we have focused on the *cash market*, that is, the market in which existing securities are traded for same- or

next-day delivery. In addition, there are markets in which Treasury notes and bonds are traded for *future* delivery. The futures contracts in Treasuries that are actively traded are for notes and long bonds with a par value of \$100,000.

Interest-rate futures markets offer institutions that know they are going to borrow or lend in the future a way to *hedge* that future position, that is, to lock in a reasonably fixed borrowing or lending rate. They also provide speculators and hedgers with a way to bet money on interest-rate movements that provide greater leverage—bang for the buck—than going short or long cash securities. Many market participants use futures to hedge the impact that interest rate changes will have upon their investment portfolios.

Since being introduced in 1976, futures markets for financial instruments have grown at a rapid pace. In fact, interest-rate futures contracts have been the most successful contracts ever launched on commodities exchanges. Their success in the United States led to the introduction of trading of similar contracts on a number of futures exchanges in foreign financial centers such as London, Frankfurt, Tokyo, and Singapore.

The rapid growth and internationalization of markets for financial futures, along with the increased transparency of market prices, has created deep and liquid markets for interest-rate futures. As a result, there are only minimal arbitrage opportunities to capitalize on price discrepancies between the rates on different futures contracts or between the rates on a futures contract and its corresponding cash instrument.

FEDERAL AGENCY SECURITIES

Over the years, Congress has shown concern for the volume of credit available to various sectors of the economy. In response, Congress has set up federal agencies whose purpose is to provide credit to the sector in question.

There are two types of federal agency securities: government-sponsored enterprises (GSEs) and federally related institutions. Most agency securities are issued by GSEs; federally related institutions only rarely issue debt on their own but instead obtain funding from the Federal Financing Bank, which was created in 1973 to reduce the cost of federal borrowing. GSEs borrow in the open market primarily by issuing notes and bonds. These securities (known in the market as *agencies*) bear interest; some are issued at face value, and others at a discount similar to the

issuance of U.S. Treasury bills. GSEs and other federal agency securities are issued in various ways. Many look to the market to determine the best yield and then sell through a syndicate of dealers. Large GSEs like Fannie Mae have regular issuances by auction, and advances in technology have facilitated the creation of a diversity of bonds with varying maturities and customized provisions.

As for the federally related institutions, there are the Federal Home Loan Bank System, which lends to the nation's savings and loan associations as well as regulates them; the Government National Mortgage Association, which funnels money into the mortgage market; Banks for Cooperatives, which make seasonal and term loans to farm cooperatives; Federal Land Banks, which give mortgages on farm properties; Federal Intermediate Credit Banks, which provide short-term financing for producers of crops and livestock; and a host of other agencies such as the Maritime Administration, the Tennessee Valley Authority, and the Export-Import Bank of the United States. All the securities sold by these federally related institutions are backed by the full faith and credit of the U.S. government, with the exception of the Tennessee Valley Authority.

Normally, agencies yield slightly more than Treasury securities of the same maturity for several reasons. First, the agency issue market is smaller than Treasury issues and therefore less liquid. Second, while all agency issues have an implicit guarantee from the federal government (some believe that it's almost inconceivable that the government would let one of them default on its obligations), the securities of only a few agencies, chiefly the federally related institutions, are explicitly backed by the full faith and credit of the U.S. government. Moreover, in the current environment there has been a move toward greater regulation of U.S. agencies, particularly of Fannie Mae and Freddie Mac, the two largest GSEs, so the value of the implicit guarantee has diminished somewhat in recent years. Third, interest income on some federal agency issues is subject to state taxation.

The volume of agencies traded has grown tremendously over the past decade, increasing to as high as \$90.2 billion per day in 2001 compared to \$5.7 billion a year earlier. Volume stood at about \$81 billion per day in the middle of 2005. The market for agencies, while smaller than that for Treasuries, is a large, active, and important sector of the money market. There were \$2.6 trillion of federal agency securities outstanding as of December 31, 2005, compared to \$4.2 trillion of Treasuries.

FEDERAL FUNDS

All banks and other *depository institutions* (savings and loan associations, commercial and savings banks, credit unions, and foreign bank branches) are required to keep reserves on deposit at their District Federal Reserve Bank.⁴ The reserve account of a depository institution (*DI* for short) is much like an individual's checking account; the DI makes deposits into its reserve account and can transfer funds out of it. The main difference is that, while an individual can let the balance in his checking account run to zero and stay there, each DI is required by law to maintain some *minimum* average balance in its reserve account over a two-week period. There is a biweekly settlement of reserve accounts which begins on Thursday and ends two weeks later on Wednesday, known as *settlement Wednesday*. Settlement rules require that, on settlement Wednesday, a bank's total reserves over the two-week period equal or exceed its total required reserves for that period. This process is referred to as *settling* with the Fed. Under *contemporaneous reserve accounting*, introduced by the Fed in February 1984, the minimum reserve balance is based on all deposits held by the DI during the current settlement period.

Of all DIs, commercial banks hold by far the largest chunk of the total reserves that are maintained at Federal Reserve Banks. Funds on deposit in a bank's reserve account are referred to as *federal funds* or *fed funds*. Any deposits a bank receives add to its supply of fed funds, while loans made and securities purchased reduce that supply. Thus, the basic amount of money any bank can lend out and otherwise invest equals the amount of funds it has received from depositors minus the reserves it is required to maintain.

For some banks, this supply of available funds roughly equals the amount they choose to invest in securities plus that demanded from them by borrowers. But for most banks it does not. Specifically, because the nation's largest corporations tend to concentrate their borrowing in big money center banks in New York City, large regional banks and other financial centers, the loans and investments these banks must fund exceed

⁴ The Federal Reserve System, which comprises 12 district Federal Reserve Banks, is the United States' central bank, and as such it is responsible for the implementation of domestic monetary policy. The Fed is described in Chapter 9 of this book. Prior to passage of the Monetary Control Act of 1980, only *member banks* in the Federal Reserve System were required to hold reserves at the Fed.

the deposits they receive. Many smaller banks, in contrast, receive more money from local depositors than they can lend locally or choose to invest otherwise. Because large banks have to meet their reserve requirements regardless of what loan demand they face and because excess reserves yield no return to smaller banks, it is natural for large banks to borrow the excess funds held by smaller banks. Federal agencies also lend idle funds in the fed funds market.

Borrowing between banks is done in the *federal funds market*. While there are some transactions for longer periods, overnight transactions dominate the fed funds market. One reason is that the amount of excess funds a given lending bank holds varies daily and unpredictably. Many transactions in fed funds are made directly, rather than through brokers. Despite the fact that transactions of this sort are all loans, the lending of fed funds is referred to as a *sale* and the borrowing of fed funds as a *purchase*. Fed funds traded for periods other than overnight are referred to as *term* fed funds.

Federal funds transactions can be initiated by either a funds lender or a funds borrower. An institution seeking to lend federal funds identifies a borrower directly, through an existing banking relationship, or indirectly, through a federal funds broker. The most commonly used method to transfer funds between depository institutions is for the lending institution to authorize its district Federal Reserve Bank to debit its reserve account and to credit the reserve account of the borrowing institution.

DIs other than domestic commercial banks also participate in the fed funds market. Foreign banks are particularly active buyers and sellers of funds.

The rate of interest paid on overnight loans of federal funds, which is called the *fed funds rate*, plays a major role in the money market; all other short-term rates relate to the funds rate. The Fed sets a target for the federal funds rate in formulating its monetary policy and announces this target at the conclusion of its regular policy meetings. By purchasing U.S. Treasury securities in the open market, the Fed increases the availability of bank reserves and the money supply, putting downward pressure on the federal funds rate. The reverse is true when the Fed sells Treasuries. These exchanges are called *open market operations*. The federal funds rate has important and wide-reaching effects. For example, the federal funds rate is used as a basis for comparison with yields on investments. Interest rates on short-term securities—such as Treasury bills and commercial paper—move about parallel with the federal funds rate, and interest rates on long-term

securities are closely linked to expectations of the funds rate, although many other factors affect the behavior of long-term rates. This was readily apparent in 2004 and 2005 when numerous increases in the federal funds rate were accompanied by a *decline* in long-term interest rates. The decline appeared to relate to a decline in inflation expectations, a major driver in the direction of long-term interest rates.

REPOS AND REVERSES

A variety of bank and nonbank dealers act as market makers in governments, mortgage securities, agencies, CDs, and bankers' acceptances (BAs). Because dealers, by definition, buy and sell for their own accounts, active dealers inevitably end up holding some securities. They will, moreover, buy and hold substantial positions if they believe that interest rates are likely to fall and that the value of these securities is therefore likely to rise. Speculation and risk taking are an inherent and important part of being a dealer.

While dealers have large amounts of capital, the positions they take are often a large multiple of that amount. As a result, dealers have to borrow to finance their positions. Using the securities they own as collateral, they can and do borrow from banks at the dealer loan rate. For the bulk of their financing, however, they resort to a cheaper alternative, entering into *repurchase agreements* (*RP agreements* or *repos*, for short) with investors. The financing of securities with a repo is known as *selling collateral* whereas lending versus collateral received is known as *buying collateral*.

Most repo financing done by dealers is on an overnight basis. It works as follows: The dealer finds a corporation, bank trust department, money fund, municipality, or other investor who has funds to invest overnight. He sells this investor, say, \$10 million of securities for roughly \$10 million, which is paid in federal funds to his bank by the investor's bank against delivery of the securities sold. At the same time, the dealer agrees to repurchase these securities the next day at a slightly higher price, reflecting the interest cost of the loan. Thus, the buyer of the securities is in effect making the dealer a one-day loan secured by the obligations sold to him. The difference between the purchase and sale prices on the repo transaction is the interest the investor earns on his loan. It is more common for the purchase and sale prices in a repo transaction to be identical; in that case, the dealer pays the investor some explicit rate of interest. The lender

has possession of the securities during the term of the loan and can sell them if the dealer defaults on the repurchase obligation.

Often a dealer will take a speculative position that he intends to hold for some time. He might then do a repo for as little as one week to as much as six months. Such agreements are known as *term repos*.

From the point of view of investors, overnight loans in the repo market offer several attractive features. A dealer can arrange continuous or “rolling” repos, a series of overnight repos renewed and adjusted each day. This allows investors to keep surplus funds invested without losing liquidity or incurring a price risk. Second, because repo transactions are secured by top-quality paper, investors expose themselves to little or no credit risk.

The overnight repo rate generally is lower than the fed funds rate. This reflects the relatively higher level of risk that investors take when lending money unsecured in the federal funds market. Also, many non-bank investors who have funds to invest overnight or for a very short term and who do not want to incur any price risk sometimes go to the repo market because (with the exception of S&Ls and other DIs) they cannot participate directly in the fed funds market. The spread between the fed funds rate and the repo rate varies; it widens if the fed funds rate is increasing rapidly and narrows when the fed funds rate is stable or declining. Changes in the spread also reflect changes in the availability of eligible collateral (volume of securities in dealers’ inventories) and in the perceived risks associated with RP investments, particularly the quality and liquidity of the collateral involved.

On term repo transactions, investors still have the advantage of their loans being secured, but they do lose some liquidity. Also, term repos have higher interest-rate risk and credit risk. To compensate for that, the rate on a repo transaction is generally higher the longer the term for which funds are lent. In addition, most repo transactions are designed to account for possible decreases in the market value of the securities offered as collateral, with a small margin of about 1% to 3% between the loan amount and the market value of the collateral at the time of the repo agreement. Banks that make dealer loans, on the other hand, charge interest slightly higher than the federal funds rate, a markup of about one-eighth to one-fourth. Thus, when borrowing funds, dealers can finance their positions more cheaply with repos, and they therefore rely mostly upon repos.

From the point of view of a lender, a repo is called a *reverse repo*, or simply a *reverse*. Dealers often use reverses to cover a short position,

that is, sell securities they do not own. To obtain securities through a reverse, a dealer finds an investor holding the required securities; he then buys these securities from the investor under an agreement that he will resell the same securities to the investor at a fixed price on some future date. In this transaction, the dealer, besides obtaining securities, is extending a loan to the investor for which he is paid some rate of interest.

A repo and a reverse are identical transactions. What a given transaction is called depends on who initiates it; typically, to a dealer hunting money, it's a repo; to a dealer hunting securities, it's a reverse.

GCF (general collateral finance) repo was introduced in 1998 by the Fixed Income Clearing Corporation (FICC) and two large dealer clearing banks, JPMorgan Chase Bank (JPMC) and Bank of New York (BoNY). It was designed to reduce transaction costs and enhance liquidity in the repo market. This is possible because GCF repos are reversed every morning and renewed every day, allowing the borrower use of collateral securities during the trading day. This process allows the borrower to choose what securities to give as collateral. Furthermore, GCF repos are settled on a net rather than a gross basis, which minimizes the cost of moving securities.

Proof of the success of GCF repos is suggested by its rapid growth and current market share, which was estimated at 54% of all interdealer repo transactions on Treasury collateral in 2002.

Importantly, the Fed uses reverses and repos to temporarily affect its portfolio in order to influence day-to-day trading in the federal funds market. This is the primary way in which the Fed alters the level of reserves in the banking system and steers the fed funds rate to the Fed's target rate. The Fed also engages in the purchase and sale of securities in order to more permanently affect the level of reserves in the banking system. The Fed's purchase of collateral in its repo transactions with the Street are called *system repos*. The Fed's sales of securities in its reverse repo transactions are called *matched sales*.

The repo market has become one of the largest segments of the money market, with over \$3.3 trillion of repurchase agreements outstanding (both term and overnight) at the end of April 2006.

EURODOLLARS

Many foreign banks will accept deposits of dollars and grant the depositor an account *denominated in dollars*. So, too, will the foreign branches

of U.S. banks. The practice of accepting dollar-denominated deposits outside the United States began in Europe, so such deposits came to be known as *Eurodollars*. The practice of accepting dollar-denominated deposits later spread to Hong Kong, Singapore, the Middle East, the Bahamas, Canada, and other financial centers around the globe. Consequently, today, *a Eurodollar deposit is simply a deposit denominated in dollars in a bank or bank branch outside the United States*, and the term *Eurodollar* has become a misnomer. Such has also been the case since 1981 with dollars deposited in *international banking facilities (IBFs)*. IBFs enable non-U.S. residents to conduct business in the United States free of U.S. banking regulations.

Most Eurodollar deposits are for large sums. They are made by corporations (foreign, multinational, and domestic), foreign central banks and other official institutions, U.S. domestic banks, and wealthy individuals. With the exception of *call money*⁵ nearly all Eurodeposits have a fixed term, which can range from overnight to five years. The bulk of Eurodollar transactions are in the range of six months and under. Banks receiving Eurodollar deposits use them to make loans denominated in dollars to foreign and domestic corporations, foreign governments and government agencies, domestic U.S. banks, and other large borrowers.

Banks that participate in the Eurodollar market actively borrow and lend Eurodollars among themselves, just as domestic banks borrow and lend in the fed funds market. The major difference between the two markets is that in the market for fed funds, most transactions are on an overnight basis, whereas in the Euromarket, interbank placements (deposits) of funds for longer periods are common.

For a domestic U.S. bank with a reserve deficiency, borrowing Eurodollars is an alternative to purchasing fed funds. Also, for a domestic bank with excess funds, a *Europlacement* (i.e., a deposit of dollars in the Euromarket) is an alternative to the sale of fed funds. Consequently, the rate on overnight Eurodollars tends to closely track the fed funds rate. It is also true that, as one goes out on the maturity scale, Eurodollar rates continue to track U.S. rates, though less closely than in the overnight market.

Eurodollar rates are higher than domestic money market rates because of perceived credit and sovereign risks surrounding the foreign

⁵ Call money is money deposited in an interest-bearing account that can be called (withdrawn) by the depositor on a day's notice.

entity holding the dollar deposits. Rates are higher also because domestic banks are subject to reserve requirements that are not applicable to Eurodollar deposits, hence raising the cost of money for U.S. banks.

Currently, *futures* for 3-month Eurodollar deposits are actively traded in Chicago and abroad as well. The market for Eurodollar futures is among the most active in the world.

FRAs

A *forward rate agreement* (FRA, pronounced like frog with no g) is the over-the-counter (OTC) equivalent of a Eurodollar futures contract. Under a FRA, two parties agree to trade a specific interest rate on a Eurodollar deposit of a specified currency, maturity, and amount, beginning on a specified date in the future, usually between three and six months. For example, the parties might agree to trade \$5 million of 3-month Eurodollars two months hence at a rate of 5%. This agreement would be termed a 2×5 FRA because the interest rate is fixed for a principal maturing five months after the contract is settled. FRAs are expressed as the rate the buyer pays on the notional deposit—the forward rate. What distinguishes a FRA from a forward trade is that, when the future date specified in the FRA agreement arrives, no Eurodeposit changes hands. Instead, there is a cash settlement. A FRA protects the buyer from future increases in interest rates. At the settlement date, if the market rate is higher than the contract rate, the seller pays the buyer the difference based on the principal, or vice versa if the market rate is lower. The principal amount is not exchanged. FRAs can be used as a gauge of expectations on the pace of future interest-rate changes. We talk more about FRAs in Chapter 18.

COMMERCIAL PAPER

While some cash-rich industrial firms participate in the bond and money markets only as lenders, many more must, at times, borrow to finance either current operations or expenditures on plant and equipment. One source of short-term funds available to a corporation is bank loans. Large firms with good credit ratings, however, have an alternative source of funds that is cheaper—namely, the sale of commercial paper. A handful of investment banking firms—Goldman, Merrill, and Lehman, for example—account for most of the placements of commercial paper.

Commercial paper is an unsecured promissory note issued for a specific amount and maturing on a specific day. All commercial paper is negotiable, but most paper sold to investors is held by them to maturity because the secondary market for commercial paper is small and rather illiquid. *Financial commercial paper* is issued by financial companies, such as banks or insurance companies, and accounts for the large majority of the commercial paper market. Large financial firms can afford to sell their paper directly to investors, but other firms typically issue their paper through dealers. Over the years, bank holding companies, municipalities, and municipal authorities have joined the ranks of commercial paper issuers.

In recent years, the commercial paper market has fluctuated between expansion and contraction, but it has nonetheless stayed larger than the Treasury bill market, with \$1.7 trillion outstanding in May 2006 compared to \$960 billion for Treasury bills. Daily issuance, known as *placements*, averaged about \$100 billion per day in 2003.

The maximum maturity for which commercial paper may be sold is 270 days, since paper with a longer maturity must be registered with the Securities and Exchange Commission (SEC), a timely and expensive procedure. In practice, very little 270-day paper is sold, and most paper sold is in the range of 90 days and under. The average maturity for commercial paper is 45 days. By regulation, commercial paper is sold in large denominations, which prevents investment by most individuals. However, individual investors hold large amounts of commercial paper through money market mutual funds. Proceeds received from commercial paper issuance must be used to finance “current transactions,” which include the funding of operating expenses and the funding of current assets such as receivables and inventories. Tracking commercial paper issuance is therefore a good way to track developments in the economy.

Since commercial paper has such short maturities, the issuer rarely will have sufficient funds coming in before the paper matures to pay off his borrowing. Instead, he expects to *roll* his paper, that is, sell new paper to obtain funds to pay off his maturing paper. Naturally, the possibility exists that some sudden change in market conditions might make it difficult or impossible for him to sell paper for some time. To guard against this risk, commercial paper issuers back all or a large proportion of their outstanding paper with lines of credit from banks.

The rate offered on commercial paper depends on its maturity, on how much the issuer wants to borrow, on the general level of money

market rates, and on the credit rating of the issuer. Almost all commercial paper is rated with respect to credit risk by one or more of several rating services: Moody's, Standard & Poor's, and Fitch. For the most part, only companies with extremely high credit ratings issue commercial paper because investors demand a very low default risk. Because of the credit risk and the illiquidity, average yields on commercial paper are slightly higher than those on Treasury obligations of similar maturity. Nevertheless, commercial paper is one of the cheapest sources of external funding available. For example, the interest rate paid on 30-day commercial paper is usually comparable to the federal funds market. Over the years, there has been only a slight risk that a commercial paper issuer might default. In fact, there were no defaults at all between the default of the Columbia Gas System in June 1991 until the end of 2000.

An increasing number of foreign entities, sovereigns, government agencies, banks, and corporations have taken to selling commercial paper in the U.S. money market. For example, finance companies that provide consumers with home loans, retail and automobile loans, and unsecured personal loans are major participants in the commercial paper market. Foreign financial firms issue most foreign commercial paper. Foreign commercial paper is commonly issued in dollars and can then be exchanged into foreign currency. A strong market has developed for *Euro commercial paper*. In general, Euro commercial paper has slightly longer maturities, and issuers can have lower credit ratings, as compared to the U.S. market. Borrowers in this market are domiciled principally in Europe and the United States.

INTEREST-RATE SWAPS

The rate that a borrower must pay depends on his credit, whether he wants to borrow fixed- or floating-rate money, and on the term for which he wants to borrow. Generally, if a credit is a particularly good credit, he will find not only that he is able to borrow more cheaply than other borrowers can, but that the advantage he enjoys over other borrowers in the rate he gets will be greatest when he borrows at a *fixed rate* for three to five years or longer. To reap the maximum benefit from his privileged access to the capital market is how a good credit should borrow. In contrast, a lesser credit will find that, when he borrows medium- to longer-term funds, his poor rating will penalize him least if he borrows at a *variable rate*. In general, the overall credit quality of swap market participants is high, with A ratings or above.

Often, a top credit, say a Morgan to pick a bank name, will find that its comparative advantage lies in borrowing medium-term, fixed-rate money, whereas what it really wants to borrow is variable-rate money. Meanwhile somewhere, some single B corporate will be saying, “The penalty I have to pay for borrowing medium term at a fixed rate is awfully high, but fixed-rate money is what I really need.” This sets the stage, realized a few prescient dealers in the early 1980s, for a *liability swap*. The triple-A credit borrows medium term at a fixed rate; the single-B credit borrows medium term at a variable rate; and then in effect, they *swap liabilities*—more precisely they swap on negotiated terms the future interest-rate payments each contract is to pay. Surprisingly, such a swap is *not a zero-sum game*. Far from it, the situation is a perfect example of the gains that can be realized from specialization along lines of comparative advantage (recall that British economist Ricardo based his famous argument for free trade on differences in national comparative advantage, and the argument for free trade still stands today on that same ground). Triple A and single B can together reduce their joint costs of borrowing by each borrowing in the market in which they get the best terms; then, using a swap, they can divvy up the savings they have realized *and* each ends up with the type of liability they wanted in the first place.

All this may sound a touch esoteric and theoretical, but it’s the basis in a nutshell of a business that has grown to where outstandings are now measured in the trillions of dollars. Indeed, according to the Bank for International Settlements, the notional amounts outstanding in U.S. dollar-denominated OTC derivatives were \$75 trillion at the end of 2005.

The swap we’ve just described, fixed for floating, is known as a *coupon swap*. A natural variation of this swap is to a *cross-currency swap*. Depending on who a borrower is, what currency he wants to borrow, and whether he wants to pay fixed or floating, it may be cheaper for him to do one sort of borrowing in one currency and then, via a swap or swaps, end up with a different borrowing in a different currency. For example, a borrower wanting to borrow dollars at a floating rate might find that his cheapest alternative is to borrow fixed-rate Swissy, swap it into fixed-rate dollars, and then do a coupon swap fixed to floating. The possibilities are endless and exist thanks to all sorts of market anomalies: differences in the terms at which corporates may borrow in different markets (e.g., Spain lacks a corporate bond market), differences in the way credits are perceived in different markets (e.g., to a German lender, Lufthansa is *the* national flag carrier, not just another credit), national differences in accounting practices

or in tax policies, and so on. When an entity borrows X and then does several swaps to get to Y , which is what he wants, he is said to *cocktail* swaps.

As the swap market has grown, swap terms have become standardized. Today, swaps are quoted at Treasuries plus, with the understanding that the Treasuries plus rate is the fixed rate for a swap against *LIBOR*, the *London Interbank Offered Rate* for Eurodollar deposits (there are many LIBORs—3-month LIBOR, 6-month LIBOR, and so on, but for most swaps 3- or 6-month LIBOR is used). Those terms would leave a borrower in the commercial paper market who wanted to pay fixed, as a number of paper issuers do, with a spread risk: the spread of the LIBOR to the commercial paper rate. To eliminate that risk, the commercial paper issuer would first swap floating to floating—the commercial paper rate to LIBOR—and then he'd swap floating to fixed—LIBOR to Treasuries plus.

The standardization of swap agreements has been a major contributor to the growth of the swaps market. Master swap agreements, introduced in the mid-1980s and which are standardized, legally binding agreements that detail the rights and obligations of each party in the swap, have been particularly important to the growth of the swaps market. These master agreements, which were initially sponsored by the International Swaps and Derivatives Association (ISDA), have helped to raise investor confidence.

A borrower, unless he happens to also be, say, a bank dealer in swaps, lacks the resources to follow all the ins and outs of and the opportunities in the swap market. So swaps are a big business for dealers who concoct and often cocktail them. Every big swap dealer—both bank and nonbank dealers are big in the business—runs a hedged swap book. Banks also use unhedged swaps as a tool of gap management. Major participants in the swaps market also include financial institutions and corporations, international organizations such as the World Bank, government-sponsored enterprises, corporate bond and mortgage-backed securities dealers, and hedge funds.

The swap business began with the swapping of liabilities. Then some entrepreneurial type recalled that what's good for the goose is good for the gander, and *asset swaps* were born. In the past, an investor who held a fixed-rate, Canadian dollar bond and who then said, "Hey, what I'd really like to be in at this moment is Aussie-dollar, floating-rate paper," would figure that to make the switch he'd have to sell his bonds, do a foreign exchange transaction, and buy new paper. His friendly corporate finance swap advisor—bank or nonbank—now tells him otherwise: with a swap

or two, he can get from the asset he has to a *synthetic* version of the asset he desires; and when the play he wants to make has run its course, he can return to his initial position simply by reversing the swaps he's put on. Today, asset swaps are a major part of the swap business.

OPTIONS

A creative tool in the money market that can be used for the enhancement of yields is trading in options—rights to buy or to sell at a fixed price over a preset period certain money market securities, and futures contracts for such securities. Options, like futures, are actively traded by portfolio managers, hedgers, speculators, and arbitrageurs.

There are two main types of options in the money market. In the futures market the most actively exchange-traded options are options on futures contracts. Second, there are also over-the-counter options traded on cash governments. For example, *government-plus* mutual funds, which seek above-average returns via increased risk taking by raising their average maturity level, like to sell to dealers covered calls against their holdings of cash governments, their objective being to enhance yield on the fund. This isn't necessarily an attractive business for dealers, since they are asked to buy calls for which they can find no natural buyers to take the other side of the trade. Nevertheless, dealers have found ways to add new products that reduce the risks that they take on the other side of the trade and which can also boost their own returns from the trade.

The area in which dealers stand to make the biggest profit is in selling proprietary products. A dealer might, for example, sell a borrower a *cap* on the rate he must pay over time on a variable-rate loan priced at a spread to LIBOR. Such a cap is simply a series of options: on each (rate) reset date, the cap gives the borrower the right to pay either the cap rate or the formula loan-agreement rate, whichever is lower. A *floor* in contrast is a series of options that promises a receiver of a variable rate the right to receive either the floor rate or the formula variable rate, whichever is higher. A *collar* is a cap cum floor that holds a rate within a given range.

In selling an option product, a dealer assumes a risk for which he naturally charges a fee that is calibrated to the risks taken by the dealer. Borrowers can reduce the fees that they incur by using collars. For example, the borrower would reduce the fee for buying a cap by collecting a fee for selling a floor.

In pricing options, caps, collars, and floors, dealers rely heavily on the classic Black-Scholes model for options pricing. This model, which was developed for the pricing of options on equities, must be modified in order to be applied to fixed-income securities. Also, *theoreticians*—*rocket scientists* or *quants* to the Street—are constantly tinkering with this model to improve its accuracy and extend its reach.

Dealers trade option products in a *book* in which they generally seek to maintain a hedged position. Because of their peculiar nature, options—except when a dealer is lucky enough to have one option position that's the mirror image of another—are far more difficult to hedge than are straight securities. Dealers rely upon complex quantitative programs to help them with the difficult task of both pricing and hedging options.

Users of options often engage in *cross-hedging*, which is a hedge in which the security to be hedged is different from that of the vehicle used for the hedge. For example, a hedger might use options on Treasury futures to hedge against his holdings of corporate bonds.

A popular option product is the *swaption*, which is an option on an interest-rate swap.

We discuss options in greater detail in Chapter 17.

CERTIFICATES OF DEPOSIT AND DEPOSIT NOTES

The maximum rate banks may pay on savings deposits and time deposits (a *time deposit* is a deposit with a fixed maturity) was once set by the Fed through *Regulation (Reg) Q*. Essentially, what Reg Q did was to make it impossible for banks and other depository institutions (who were each subject to their own versions of Reg Q) to compete with each other for small deposits by offering depositors higher interest rates.⁶ One exception to Reg Q was that, on large deposits, \$100,000 or more, banks used to be able to pay any rate they chose so long as the deposit had a minimum maturity of 14 days. This exception led, so to speak, to the invention in 1961 of negotiable certificates of deposit.

⁶ The rates banks and thrifts may pay depositors were gradually deregulated under the Monetary Control Act (MCA) of 1980. Also the Banking Act of 1982 permitted depository institutions to begin offering unregulated rates on Super-NOW and money market deposit accounts, which allowed consumers to earn interest on their demand deposits.

There are many corporations and other large investors that have hundreds of thousands, even millions, of dollars they could invest in bank time deposits. Few do so, however, because they would lose liquidity by making a deposit with a fixed maturity. The illiquidity of time deposits and their consequent lack of appeal to investors led banks, who were free to bid high rates for large deposits, to begin to offer big investors *negotiable certificates of deposit*, *CDs* for short.

A *certificate of deposit (CD)* is a certificate which indicates that a specified sum of money has been deposited in the issuing depository institution. The certificate states the amount of the deposit, maturity date of the deposit, the interest rate, and the method by which the interest is calculated. CDs are issued by banks and thrifts in order to finance their business activities. Nonnegotiable CDs must be held by the depositor until the maturity date. Negotiable CDs, introduced in the early sixties, allow the owner to sell the CDs on the open market prior to the maturity date.

There are four types of CDs, categorized based on the issuer. *Domestic CDs* are issued by domestic banks. *Eurodollar CDs (Euro CDs)* are issued outside the United States but are denominated in dollars. *Yankee CDs* are denominated in dollars and are issued by a foreign bank's branch within the United States. Last, *thrift CDs* are issued by savings and loan associations and savings banks.

The interest rate paid on CDs was once predominantly a fixed rate, but this has changed over the years. These days, the interest rate can vary, as is the case with *variable CDs*. The term on CDs can also vary and is not always fixed. For example, higher-yielding CDs sometimes have "call" features that enable issuing banks to terminate the CD after a specified period of time. Callable CDs are more likely to be called when interest rates decline, because the issuing banks can then reissue the CDs at lower rates.

Small denomination CDs are sold in denominations smaller than \$100,000. Large denomination, or "jumbo," CDs are sold in denominations over \$100,000, though they are normally sold in \$1 million units. CDs can have any maturity longer than 14 days, and some 5- and even 7-year CDs have been sold (these pay interest semiannually). Most CDs, however, have an *original maturity* of 1 to 12 months though some have maturities of five years or more. All CDs are guaranteed by the FDIC for up to \$100,000.

In the 1980s, CDs issued by money center banks were a top money market instrument, and well over \$100 billion of them were issued by

money center and other large banks. Today they are a far smaller percentage of the money market although there remains a relatively large market for CDs. In July 2005 there were \$900 billion of small time deposits outstanding and \$1.226 trillion of large time deposits. Money market mutual funds held \$177 billion of time and savings deposits as of March 2005.

Today, when large banks want to buy term deposits wholesale, they turn typically to the *deposit note* market. Deposit notes are generally sold to institutional investors in denominations of \$1 million, but federal deposit insurance covers only \$100,000 of the deposit. Similar to negotiable CDs, deposit notes normally carry a fixed rate of interest, except that interest payments are calculated in the same manner as interest payments for commercial bonds. Original maturities on deposit notes range from 18 months to 5 years. Deposit notes pay a fixed rate, but what banks want today is floating-rate money; so, when they sell deposit notes, they usually do an interest-rate swap, fixed for floating, and end up in the best of all possible worlds with no reserve requirements and with floating-rate debt that does not have to be constantly rolled as was necessary with short-term CDs.

Bank notes are a variant on deposit notes. A bank selling a bank note claims that the money garnered is *not* a deposit and that it therefore does not have to pay FDIC insurance premiums on it, a point that the FDIC has disputed. The deposit and bank note markets are a part of the medium-term note market we described above.

The old standard variety of 1-, 3-, and 6-month wholesale CDs is still issued by some regional banks and thrifts that are good credits. But the market for CDs has shrunk over the years as a percentage of the overall money market.

Banks used to sell a lot of their CDs directly to investors. Sometimes, however, banks paid dealers a small fee to sell their new CDs. These same dealers made an active secondary market in bank CDs. Today, banks issue deposit notes through dealers who, depending on the situation, may act as agent or principal. These dealers also make a secondary market in deposit notes. Many brokerage firms also offer CDs. These *deposit brokers* often offer higher relative interest rates by pooling their depositors' funds. CDs purchased from deposit brokers can sometimes be sold, either at a profit if interest rates have fallen or at a loss (of some of the original deposit) if interest rates have risen.

Bank paper, whatever form it takes, always trades at a spread above Treasuries of the same maturity. Investors regard bank paper as carrying

some credit risk, which Treasuries do not; also, investors regard bank paper as being significantly less liquid than Treasuries; hence, investors demand some extra yield for buying bank paper instead of Treasuries.

Eurodollar CDs

A Eurodollar time deposit, like a domestic time deposit, is an illiquid asset. In response to demands by investors seeking greater liquidity, banks in London accepting Eurodollar deposits began to issue *Eurodollar CDs*. These resemble domestic CDs except that instead of being the liability of a domestic bank, they are the liability of either the foreign branch of a U.S. bank or of some other foreign bank. Eurodollar CDs are primarily issued in London and are sometimes termed *London dollar CDs*.

Most of the Eurodollar CDs are purchased by other banks operating in the Euromarket. A large proportion of the remainder is sold to U.S. corporations and to other U.S. institutional investors. Many Euro CDs are issued through dealers and brokers who also make a secondary market in these securities. Most Eurodollar CDs are fixed rate, with maturities from three to six months. The average maturity of Eurodollar CDs is less than six months, and their average size is in the millions of dollars. As a result, money market funds are the only route for most individuals.

For the investor, a key advantage of buying Euro CDs is that they offer a higher return than do domestic CDs. A key advantage for U.S. banks holding Eurodollar deposits is that such deposits are free of Federal Reserve statutory requirements. The offsetting disadvantages are that they are less liquid and expose the investor to some extra risk (perceived by some, not by others) because they are issued outside the United States.

As with the market for domestic wholesale CDs, the market for Eurodollar CDs is fairly large but relatively illiquid. One change from the past is that whereas quality-conscious American investors used to want top-10 American names only, today they are more likely to be willing to buy foreign-name paper. It has finally dawned on U.S. investors that a number of foreign banks are top credits and that their deposits aren't necessarily at any greater risk when held in these banks as when they are held in U.S. banks.

Yankee CDs

Yankee CDs are CDs issued by U.S. branches of foreign banks. The name is taken from Yankee bonds, which are bonds issued in the domestic market by foreign borrowers.

When Yankee CDs were first issued, they yielded more than domestic CDs because Yankee CDs were less liquid than domestic CDs and because foreign banks were relatively unknown and investors therefore perceived their credit risk to be higher. Today, perceptions about foreign banks have improved, and yields on Yankee CDs have hence moved closer to those of domestic CDs.

The major buyers of Yankee CDs are corporations seeking higher yields and those which “fund to dates” (i.e., invest in short-term securities maturing on the date funds will be needed).

Because of the loosening of reserve requirements for foreign banks in December 1990, the Yankee CD market experienced rapid growth in the early 1990s and stood at about \$450 billion in March 2005. The changes in restrictions encouraged foreign banks to issue Yankee CDs rather than Eurodollar CDs. Yankee banks, including the top Japanese banks, are big buyers of funds in the deposit note market.

BANKERS' ACCEPTANCES

A *draft* is a promise to pay. If the date of the payment is in the future, the draft is called a *time draft*. An *acceptance* is a time draft, payment of which has been guaranteed (accepted) by a financial institution. If the financial institution is a bank, it is called a *bankers' acceptance (BA)*.

BAs are typically used in the trade of goods, often in importing and exporting with firms from foreign countries. For example, suppose a U.S. importer wants to buy shoes from a foreign manufacturer and pay for them four months later after he has had time to sell them in the United States. The importer issues a time draft with a maturity of four months. His bank “accepts” the draft (creating the bankers' acceptance), effectively guaranteeing payment to the holder on the due date. By guaranteeing payment, the bank substitutes its creditworthiness for that of the importer, which gives the foreign manufacturer greater confidence that it will be paid. The bank sends the acceptance to the foreign firm, which now has a BA that is negotiable. The foreign manufacturer can hold the BA until maturity,

sell it to an investor, or present it at its own bank for immediate payment. Since manufacturers are not in the business of selling notes to investors, the manufacturer typically presents the BA for payment prior to the maturity date and receives a discounted amount, less than the face value. Now if the bank desires, it can sell the BA before it matures.

An importer sometimes goes the route of bankers' acceptances when he feels that the short-term interest rate he could pay in the open market might be lower than the rate he would be charged at his bank and he is too small to go into the open market on his own.

Regardless of who ends up holding the acceptance, it is the importer's responsibility to provide its U.S. bank with sufficient funds to pay off the acceptance at maturity. If the importer fails to do so, the bank is still responsible for making payment. Because a bank has guaranteed payment, BAs are highly liquid. The discount on which the BA is sold is based on prevailing interest rates and the creditworthiness of the accepting bank. Bankers' acceptances are similar to T-bills in that they have a similar range of maturities, though with superior yields. BAs are of higher quality and have slightly lower yields than commercial paper because they bear the guarantee (acceptance) of a bank rather than a corporation. BAs are usually issued in denominations over \$100,000, and their maturities generally range from 30 to 180 days.

As in our previous example, suppose a U.S. importer wants to buy shoes in Brazil and pay for them four months later after he has had time to sell them in the United States. One approach would be for the importer to borrow from his bank; however, short-term rates may be lower in the open market. If they are and if the importer is too small to go into the open market on his own, then he can go the bankers' acceptance route.

In that case, he has his bank write a letter of credit for the amount of the sale and sends this letter to the Brazilian exporter. Upon export of the shoes, the Brazilian firm, using this letter of credit, draws a time draft on the importer's U.S. bank and discounts this draft at its local bank, thereby obtaining immediate payment for its goods. The Brazilian bank, in turn, sends the time draft to the importer's U.S. bank, which then stamps "accepted" on the draft (i.e., the bank guarantees payment on the draft and thereby creates an *acceptance*). Once this is done, the draft becomes an irrevocable primary obligation of the accepting bank. At this point, if the Brazilian bank did not want cash immediately, the U.S. bank would return the draft to that bank, which would hold it as an investment and then present it to the U.S. bank for payment at maturity. If, on the other hand,

the Brazilian bank wanted cash immediately, the U.S. bank would pay it and then either hold the acceptance itself or sell it to an investor. Regardless of who ends up holding the acceptance, it is the importer's responsibility to provide its U.S. bank with sufficient funds to pay off the acceptance at maturity. If the importer fails to do so, the bank is still responsible for making payment at maturity.

The example above illustrates how an acceptance can arise out of a U.S. import transaction. Acceptances also arise in connection with U.S. export sales, trade between third countries (e.g., Japanese imports of oil from the Middle East), the domestic shipment of goods, and domestic or foreign storage of readily marketable staples. Currently, most BAs arise out of foreign trade; they may be in manufactured goods but more typically are in bulk commodities, such as cocoa, cotton, coffee, and crude oil. Most bankers' acceptances are issued by money centers, large banks in trading cities, and U.S. branches and agencies of foreign banks. Major investors in BAs are other banks, foreign central banks, money market funds, corporations, and other domestic and foreign institutional investors. Because of the complex nature of acceptance operations, only large banks with well-staffed foreign departments act as accepting banks. Commercial banks tend to keep many of their own acceptances, rather than trade them, and the rest are sold through dealers or by the banks themselves.

As a financial instrument, BAs compete with commercial papers and bank loans, but only on a small scale. BAs are relatively cumbersome paper-based instruments, are not well suited to modern finance, and have fallen from active use. Only about \$4 billion of bankers' acceptances were outstanding as of early 2006. Markets are inactive, and robust trading is generally not expected to reemerge in the near term.

LOAN PARTICIPATIONS

Loan participations are loans shared by a group of banks when the loan might be too large for any one of the banks to make on its own, either because of capital constraints or a preference about how the bank wants to allocate its capital. Banks sell high-quality, short-term loans that they make under a bid option built into backup lines of credit that they extend to issuers of commercial paper. Banks sell participations in such loans to traditional money market investors who view them as a substitute for commercial paper, since such loans, like commercial paper, are short-term,

unsecured, corporate IOUs; also, such loan participations carry yields in line with those on commercial paper.

The second sort of loan participations that money center banks sell is participations in big, lower-credit-quality loans. Loan participations of this second sort generally have maturities ranging out to seven years and could in no sense be considered money market paper. The loan participation market is very inactive.

MEDIUM-TERM NOTES

Medium-term notes (MTNs) began as an alternative to the commercial paper market, a short-term market, and the bond market, a long-term market. Basically, the issuer files, if it's not a bank—bank securities are exempt—a shelf registration with the SEC; it then posts rates for different maturities and sells its paper off the shelf through a dealer or group of dealers. MTNs are interest-bearing, not discount, securities, and they pay on a corporate bond basis.

Initially, maturities of MTNs ranged from nine months out to several years; the paper really was medium term. Then, as both investors and issuers became comfortable with the MTN market, maturities of new MTNs began to lengthen; MTN maturities now run out, in a few instances, as far as 30, even 40 years. Over time, more and more MTNs began to resemble corporate bonds; for example, some MTNs are callable, some have put features, some are collateralized, some are floating rate, and so on. Also, almost every borrower in the corporate MTN market has an investment-grade rating. The steady convergence of the characteristics of MTNs and corporate bonds raises the question of what differences, if any, there now are between MTNs and corporate bonds.

The answer is that corporate bonds differ from MTNs in the way in which they are underwritten. If an issuer wants a good chunk of money, at least \$100 million in a single maturity, on a given date at a given rate, it is cost-effective for him to finance with an underwritten corporate bond. MTNs are more flexible, however, because an issuer can raise money continuously in different maturities, which is better for amounts under \$100 million. Corporations are also attracted to MTNs in periods of uncertainty because they are discreet; only the investor, the agent, and the issuer know about them. This can make the MTN more attractive, at times, relative to corporate bonds, because the issuer needn't provide the same yield concession to investors that it would on large offerings of corporate

bonds. Moreover, because of the various costs associated with new corporate offerings, it is cost-prohibitive to frequently issue corporate bonds of denominations smaller than \$100 million.

Today, the largest issuers of MTNs are nonfinancial companies. Nevertheless, finance companies, which dominated the market in the 1980s, still access the market to meet their large and varied financing needs. It suits these companies to make continuous offerings of their paper in different maturities and to receive continuous inflows of monies in different maturities.

MTNs are the success story of the 1980s. During this period, outstandings of MTNs went from zero to over \$70 billion by the end of the decade, and to \$639 billion by the end of 2004. At the end of 2003, there were 442 MTN programs outstanding. The vast majority of MTNs are investment grade, with only 3% of total outstandings rated below investment grade at the end of 2003. Today, the MTN market accounts for a sizable share of the mid- to long-term borrowing by U.S. companies. The MTN market has also extended abroad into a strong market for Euro medium-term notes.

MUNICIPAL NOTES

Debt securities issued by state and local governments and their authorities are referred to as *municipal securities* (*munis*). Such securities can be divided into two broad categories: general obligation (GO) and revenue bonds. GO securities are backed by the credit of the issuer and are sold in anticipation of other funds, such as taxes. Revenue municipal securities are backed by the revenues generated by projects financed by the bond—such as hospitals, utilities, and airports.

Municipal notes, which are an important money market instrument, are issued with maturities ranging from a month to a year. Municipal bonds have maturities longer than a year. They bear interest, and minimum denominations are highly variable ranging anywhere from \$5,000 to \$5 million. The minimum denomination has not changed at all since the 1980s, in contrast to the Treasury market where minimum denominations have been cut to \$1,000. The minimum denomination is set by the Municipal Securities Rulemaking Board (MSRB). As in most segments of the bond market, trades of \$1 million or more tend to reflect a volume discount, so any transactions smaller than that could be more expensive to investors who are buying, and the proceeds of sale could be smaller.

Most muni notes are general obligation securities backed by the issuer's pledge of its full faith, credit, and taxing power. While this sounds comforting, there is always some risk involved, as history would attest. For example, California's Orange County was forced to declare bankruptcy in 1994 after losing \$1.7 billion on incorrect bets it made on interest rates. Such situations are rare, but the event illustrates the very real possibility that municipalities could default on their securities. Investors can evaluate the credit risk associated with publicly offered muni notes by reviewing the credit ratings provided by the major rating agencies such as Moody's and Standard & Poor's.

The major attraction of municipal notes to an investor is that interest income on most of them is exempt or at least partially exempt from federal taxation and usually also from any income taxes levied within the state in which they are issued. The value of this tax exemption is greater the higher the investor's tax bracket, so municipal bonds are very popular with individual investors looking for tax shelters. These include cash-rich corporations and wealthy individuals, and tax-free mutual funds designed to appeal to high-tax-bracket investors.

Large muni-note issues are sold to investors by dealers who obtain the securities either through negotiation with the issuer or through competitive bidding. These same dealers also make a secondary market in muni notes.

The yield a municipality must pay to issue notes depends significantly upon its credit rating, the length of time for which it borrows, and the general level of short-term rates. Yields are also affected by changes in the tax code, which can affect the demand for municipal securities in general. Yields on revenue bonds tend to be higher than for that of GO bonds given that the revenue stream for revenue bonds can't be known with certainty. It used to be that an issuer with a good credit rating could normally borrow at a rate well below the yield on governments of equivalent maturity because the value to the investor of the tax exemption attached to municipal securities. Over the years, numerous complex changes to the federal tax code have lessened the value of the tax exemption attached to municipal securities. As a result, muni securities now trade at yields that are closer to that of governments than they did in the past. This is especially the case for longer maturities such as 30-year muni securities, which have recently traded at yields almost equal to governments. Ten-year muni securities have traded at yields equal to about 85% of governments.

MORTGAGE-BACKED, PASS-THROUGH SECURITIES

Mortgage-backed, pass-through securities are a hybrid debt instrument, one that has often been seen as the most complex security ever traded on Wall Street. Strictly speaking, pass-throughs are *not* a money market instrument, since their average life, a variable number at best, exceeds by far that of true money market instruments. However, pass-throughs are traded so actively and in such volume that it is hard to write about the money market without mentioning them here and there.

The Securities

Total residential mortgage debt outstanding stood at \$8.6 trillion in December 2005, well above the \$4.2 trillion of Treasuries outstanding. About half of residential mortgage debt has been securitized and thus used to back various types of negotiable securities, which in turn have been sold to investors. The securitization of mortgages increases the amount of capital available for the financing of residential mortgages.

Pass-through securities are formed when mortgages are pooled and undivided interests in the pool are sold. *Pass-through* means that the cash flow from the underlying mortgages is *passed through* to the holders of the securities via *monthly payments of interest and principal*. *Undivided* means that each security holder has a proportionate interest in each cash flow generated by the pool. Payments of principal on a pass-through include *prepayments*, which occur when a mortgage holder prepays the remaining principal on his mortgage because he moves, refinances his mortgage, or, less commonly, dies.

Pass-throughs are based on mortgages with a 30-year life, but because of prepayments, they have, in normal times, if such exist, an expected life of much less than that. In recent years, for example, the expected life for most mortgages has been around five years, owing to both the strength of the housing market, which has spurred high levels of housing turnover, and the high level of mortgage refinancing activity. Prepayment rates on pass-throughs vary with the level of mortgage rates. In years in which mortgage rates are high, people choose not to move or to refinance, which cuts prepayment rates sharply. In contrast, low mortgage rates, such as those seen over the past few years, have brought forth a flood of refinancing of existing high-rate mortgages. Indeed, \$2.3 trillion of mortgages were

refinanced in 2003, and another \$1.3 trillion were refinanced in 2004. The resulting high rate of prepayment on some high-coupon Ginnies and other mortgage-backed securities caused these securities to be viewed and traded as oddball, short-term Treasuries.

Pass-throughs have existed since 1970 when Ginnie Mae issued them, but they first made sense on a broad scale when several federal credit agencies began to provide credit guarantees and standards of uniformity for pass-throughs issued through them. This made pools of mortgages underlying pass-throughs readily marketable; in particular, the standardization of mortgage characteristics within pools made the resulting securities easier to analyze and, thus, more suitable for nontraditional mortgage investors. Also, the credit guarantee by a federal agency lessened investor concerns about collection of amounts due.

Mortgage originators such as savings and loans, commercial banks, and mortgage companies are active in pooling mortgages to back pass-throughs. An originator can either issue a private pass-through or file the necessary documents with a guarantor to issue a pass-through backed by the guarantor. The sale of a pass-through security represents a sale of assets; thus a pass-through is not a debt obligation of the originator.

The Issuers

Pass-throughs come in four flavors: there are Ginnie Mae, Freddie Mac, and Fannie Mae pass-throughs issued by federal or quasi-federal credit agencies; also, there are private pass-throughs. All pass-throughs are structured similarly, but differences exist among the four types with respect to the nature of the credit guarantee, if any; the size of the pools used; and the nature of the underlying mortgages. Because of these, different types of pass-throughs trade at spreads that vary from one to the other.

Pass-throughs guaranteed by the *Government National Mortgage Association (GNMA)* are known to the Street as *Ginnie Maes*. The mortgage pools underlying GNMA pass-throughs are made up of mortgages that are either insured by the Federal Housing Administration (FHA) or guaranteed by the Department of Veterans Affairs (VA). Other guarantors or issuers of loans eligible as collateral for Ginnie Mae mortgage-backed securities include the Department of Agriculture's Rural Housing Service (RHS) and the Department of Housing and Urban Development's Office of Public and Indian Housing (PIH). GNMA pass-throughs are the only mortgage-backed securities

backed by the full faith and credit of the U.S. government. Pass-throughs issued by GNMA are fully modified: regardless of whether mortgage payments are received, the holders of GNMA receive full and timely payment of principal and interest due them.

The *Federal Home Loan Mortgage Corporation (FHLMC)*, created by the Federal Home Loan Banks, and the *Federal National Mortgage Association (FNMA)*, also issue pass-throughs. FHLMC's pass-throughs have been dubbed *Freddie Macs*, and FNMA's are known as *Fannie Maes*. Freddie Macs are based on *conventional mortgages*: single-family residential mortgages that are neither guaranteed by the VA nor insured by the FHA. Whereas GNMA and FNMA guarantee the timely payment of interest and principal, FHLMC guarantees only the timely payment of interest and the ultimate payment (within a year) of principal. Because of the difference in guarantee, Freddie Macs trade at a spread above Ginnie Maes.

The fourth type of pass-through security is private pass-throughs. In terms of volume outstanding, this type of pass-through is the least important of the four types discussed.

Pass-throughs are attractive to investors; they are perceived to carry little or no credit risk (as in the case of GNMA) and yield more than Treasuries of approximately similar maturity. For example, in May 2006 a 10-year Fannie Mae yielded 35 basis points more than a comparable Treasury. Perceptions about the risks of holding mortgage-backed securities issued by Fannie and Freddie have changed in recent years in response to the rapid growth in the size of Fannie and Freddie's balance sheet and the possibility of more stringent oversight from Congress. Nevertheless, these concerns have had only a modest effect on yield spreads on mortgage-backed securities and Treasuries. Investors are also attracted to the deep liquidity that can be found in the pass-through market and to the wide variety of products available. Pass-throughs are also attractive as a vehicle for receiving monthly income.

Pass-throughs are bought by banks, savings and loan associations, mutual funds, state and local governments, insurance companies, pension funds, foreign investors, and a wide range of other investors.

REVIEW IN BRIEF

- The markets for all money market instruments are made in part by brokers and dealers.

- There are many different instruments that are part of the money market, one of the most prominent of which are U.S. Treasuries, particularly U.S. T-bills.
- Agency securities have grown sharply relative to Treasuries and have become a very active market.
- The repo market is a very large segment of the money market, with over \$3.3 trillion outstanding in mid-2006.
- The Eurodollar market has grown considerably, and the futures market for Eurodollars is among the most active of futures markets in the world.
- The market for interest-rate swaps is one of the largest segments of the fixed-income market, with tens of trillions of dollars outstanding. The standardization of swap agreements has facilitated this growth.
- The market for CDs has grown slowly relative to other segments of the money market, but it is fairly large at around \$2 trillion.
- The mortgage-backed securities market is now larger than the Treasury market, helped by historically low long-term interest rates and by the growth of Fannie Mae and Freddie Mac.

Bond Valuation

Alex Edmans

A *bond* is a security that promises to pay a sequence of cash flows that are either fixed or predetermined by a formula. It is therefore known as a *fixed-income security*. Bonds are typically issued by the federal government, municipalities, or corporations as a way of raising money. A bond with a *maturity*, or life, of less than one year is called a *bill*.

The owner of a bond can receive two types of cash flows: principal and interest. The *principal*, or *par value*, of a bond is the amount of money originally lent by the bond investor to the bond issuer, and is repaid at maturity. The *interest* is the periodic payment made to the investor during the bond's life. The *coupon* is the actual value of interest paid; the coupon rate can be either *fixed* (a preset percentage of par value) or *floating* (tied to a benchmark interest rate and periodically reset as the benchmark rate changes). Throughout this chapter we focus on fixed coupons; however, the same principles apply to floating-rate bonds.

ZERO-COUPON BONDS

We start by analyzing how to value the simplest type of bond: one that pays no coupons. It therefore gives the investor one cash flow only: the repayment of principal at maturity. Such a bond can be easily valued by

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discounting this future cash flow back to today. In general, if r is the periodic discount rate (i.e., the rate of return available on bonds of equivalent risk) and A is the principal to be received t periods from today, the current price of the bond is given by:

$$P = \frac{A}{(1+r)^t}$$

For example, consider a zero-coupon bond that promises to pay \$100 three years from now (Bond A). Bonds of equivalent risk offer a 5% return per year. Therefore, the price of the bond today is:

$$P = \frac{100}{(1+0.05)^3} = \$86.38 \quad (4.1)$$

Equivalently, given the bond's price, we can work out the rate of return or *yield to maturity* that the bond is offering. If a 4-year zero-coupon bond with a par value of \$100 (Bond B) is currently trading for \$80 in the market, the yield is given by:

$$y = \left(\frac{100}{80} \right)^{1/4} - 1 = 5.74\%$$

Equation (4.1) shows that there is an inverse relationship between the bond's price and its yield. The reason for this is that the cash flows from the bond are fixed and independent of the rates of return available elsewhere. Consider Bond A, which costs \$86.38 today and pays \$100 in three years. If the rate of return available on other bonds suddenly rises (e.g., there is a general rise in interest rates, because of Federal Reserve tightening), you would get more than \$100 in three years' time for investing \$86.38 today. But Bond A is still going to pay you only a fixed \$100. Therefore, you will be willing to pay less than \$86.38 for it, and its price will fall. Conversely, if the rate of return available elsewhere falls, the bond's price will rise.

The yield of a bond must equal the yield offered by securities of equivalent risk in an efficient market; otherwise investors would sell the bond with the lower yield (and thus higher price) and buy the bond with the higher yield (and thus lower price).

Finally, since $r > 0$, note that the price of a zero-coupon bond is always at a discount to its par value; thus, such a bond is also often referred

to as a *discount bond*. Since it does not pay any coupons, the only way the investor can get a return is by earning the difference between the price paid and the par value received in the future. Therefore she will be willing to purchase it only if it is available at a discount to par.

COUPON-BEARING BONDS

We now consider coupon-bearing bonds, which pay regular cash flows during the life of the bond in addition to the repayment of principal at maturity. Bonds in the United States pay interest semiannually. Therefore, a bond with a coupon rate of $c\%$ per year will make coupon payments of $(c/2)\%$ every six months.

We value such a bond by taking the present value of each individual promised cash flow (interest and principal), and summing these present values: the present value of a sequence of cash flows is the sum of the present values of each individual cash flow. Thus:

$$P = \sum_{t=1}^T \frac{c/2}{(1+r)^t} + \frac{A}{(1+r)^T} \quad (4.2)$$

where r is the semiannual (six-month) yield and T is the maturity of the bond: the bond matures in T six-month periods from today.

Consider a \$100 par value bond with an 8% semiannual coupon, which matures in two years. The six-month rate of return available on bonds of equivalent risk is 3%. The bond's price is given by:

$$P = \frac{4}{1.03} + \frac{4}{1.03^2} + \frac{4}{1.03^3} + \frac{4}{1.03^4} + \frac{100}{1.03^4} = \$103.72$$

Note that this bond trades at a premium to par value and is thus referred to as a *premium bond*. Since the semiannual coupon rate of 4% exceeds the 3% available elsewhere, an investor will be willing to pay more than par value for it. In general, if the coupon rate exceeds the yield, the bond will be a premium bond. If it equals the yield, it is a *par bond*. If it is less than the yield, it is a discount bond—as we have seen, one example is a zero-coupon bond as the coupon rate is zero.

Again, we have an inverse relationship between the bond's price and its yield. The intuition is the same as for the zero-coupon bond: cash flows are independent of outside investment opportunities. If the rate of return

available elsewhere rises from 3%, outside opportunities are more attractive, but the bond will still pay only \$40 every six months and \$100 at maturity. Therefore it will be worth less; indeed, once the yield crosses 4%, the price of the bond will drop to below \$100.

As before, we can work out the yield to maturity from the bond's current price by using Equation (4.2). It is often impossible to solve for r analytically, so computers in practice use a trial-and-error method. For a coupon-bearing bond, the yield reflects the return an investor earns from two methods: the interim coupons and the capital gain or loss from buying the bond below or above par. For a zero-coupon bond, the return is generated entirely through the capital gain (purchasing the bond at a discount). For a premium bond, an investor is willing to suffer a capital loss at maturity because the interim coupons are sufficiently attractive.

BOND EQUIVALENT YIELD

We have been careful to stress the compounding frequency (semiannual in the above case) because it is critical to the bond's valuation. With a coupon of 8% paid annually, a 1-year bill with a face value of \$100 (Bill C) will pay the investor \$108 at the end of the year. An otherwise equivalent Bill D which pays the 8% coupon semiannually (i.e., 4% every six months) will return the investor \$4 in six months and \$104 at the end of the year. Now the interim payment of \$4 can be reinvested at 4% for the final six months and so produces \$4.16 at the end of the year, so the overall bill is worth \$108.16. What is at work here is *compound interest*: any quoted rate of interest yields more dollars of return; the more frequently interest is paid, the earlier interest can be reinvested. The difference of \$0.16 between the two bills' values is *interest on interest*.

Therefore, the yield of a bill is not a sufficient statistic; it does not tell you all you need to know to determine how much return you get from a bill. You also need to know the compounding frequency. The yield is 8% for Bills C and D, but for Bill D the yield is more frequently compounded (semiannual as opposed to annual), and so it is more desirable. It therefore does not make sense to compare yields across bonds unless they are quoted at a common frequency. The convention is to quote a *bond equivalent yield* assuming semiannual compounding—the yield the bill would offer *as if* it were compounded semiannually. The bond equivalent yield allows investors to compare the return of all debt securities on an “apples to apples” basis, regardless of their actual compounding frequency. This is the

rate quoted in the industry; for example, in the *Wall Street Journal*, *Financial Times*, and dealers' trading screens.

For Bill D, the bond equivalent yield equals the coupon rate of 8% as the coupon is paid semiannually. For Bill C, it is given by solving for r in the equation below:

$$100 = \frac{108}{\left(1 + \frac{r}{2}\right)^2} \Rightarrow r = 7.85\%$$

Since the 8% coupon is only paid annually, it is worth less than 8% paid semiannually; in fact it is equivalent to receiving 7.85% paid semiannually.

In general, a rate r compounded m times per year can be converted to a semiannually compounded bond equivalent yield, b , using the formula below:

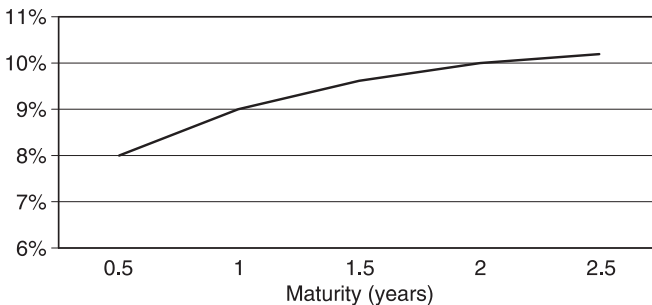
$$\left(1 + \frac{r}{m}\right)^m = \left(1 + \frac{b}{2}\right)^2$$

THE YIELD CURVE

The *yield curve* plots the yields on zero-coupon bonds of different maturities. See Figure 4.1 for an example. If the yield curve were flat, this would imply that the yield is independent of a bond's maturity. Let's take a semiannually compounded yield of 8%. An investor with a one-year horizon has two options: she can either invest in a one-year bond now and earn $1.04^2 - 1 = 8.16\%$ over the year (Option E), or invest initially at 4%

FIGURE 4.1

Sample yield curve



for six months and reinvest the proceeds for another six months at the interest rate prevailing at the time (Option F). The investor will be indifferent to the two alternatives only if two conditions hold: (1) the investor expects the 6-month rate to stay at 4% in six months' time, and (2) the investor is risk-neutral.

In reality, the yield curve is almost never flat. This is because neither of the above conditions holds in practice. Let us consider each in turn.

Expectations

Expectations of interest rates are changing all the time. Each day, investors scrutinize data releases (such as unemployment figures and price inflation) to forecast how the Federal Reserve will change the interest rate. If investors expected the 6-month rate to rise to 5% in six months' time, they could expect $1.04 \times 1.05 - 1 = 9.2\%$ from Option F. This compares favorably to the 8.16% if they invested for one year. Therefore, investors would be happy to lock their money in for one year if they were offered a rate of $(1.092^{1/2} - 1) \times 2 = 9\%$ compounded semiannually. Because yields are expected to rise from 8%, investors demand a higher rate for investing for the long term. The yield curve will be upward sloping as in Figure 4.1. Investors obtain a higher return for locking their money up long term and thus being unable to benefit from higher future interest rates. Except in unusual economic conditions, yield curves slope upward.

By contrast, if interest rates are expected to decline (for example, the economy is entering a recession, and the Fed is expected to cut interest rates), the yield curve will be downward sloping. If investors expected the 6-month rate to fall to 3% in six months' time, they would earn $1.04 \times 1.03 - 1 = 7.12\%$ from Option F. Therefore, they would be willing to accept only $(1.0712^{1/2} - 1) \times 2 = 7\%$ compounded semiannually. Because interest rates are expected to fall from 8%, investors will be willing to lock in a rate of less than 8% for the long term.

Price Risk

A second reason for an upward sloping yield curve is that investing for the long run is riskier than investing for the short term. In choosing among alternative securities, an investor considers three factors: risk, liquidity, and return. (We ignore liquidity considerations in this chapter.) Even if the bond is sure not to default (as is the case for a U.S. Treasury bond) and thus

bears no *credit risk*, the investor will still bear *price risk*—if the investor later sold the security, she may suffer a loss because interest rates had subsequently risen. Most investors are *risk-averse*; they will accept lower yields to obtain lower risk.

The price risk to which bonds expose the investor is *larger* the *longer* their current maturity. This can be most clearly seen by recalling the formula for the price of a zero-coupon bond:

$$P = \frac{A}{(1+r)^t}$$

The larger t is, the greater the effect of a change in r on the current price as it is compounded over a greater number of periods. Assume the current market rate is 8% compounded semiannually, and the yield curve is flat. A 1-year bond with a face value of \$1,000 is worth \$925, and a 5-year bond with a face value of \$1,000 is worth \$676. If the rate rises to 9%, the value of the 1-year bond falls by 0.95% to \$916. The 5-year bond falls much more sharply, by 4.68% to \$644. Therefore, even if interest rates are expected to stay constant, the yield curve may still slope upward as longer maturity securities offer higher yields to compensate for their increased price risk.

Yield spreads between different securities are always measured in terms of basis points (bp). A *basis point* is 1/100 of 1 percentage point. Thus, if 5-month bills are quoted at 1.0545 and 6-month bills at 1.0556, the spread between the two is said to be 11 basis points.

FLUCTUATIONS IN A BOND'S PRICE

Normally, the price at which a bond sells will rise as the bond approaches maturity. For example, to yield 10% compounded semiannually, a 6-month bill must be priced at \$95.24 per \$100 of face value. For the same bill three months later (three months closer to maturity) to yield 10%, it must have risen in price to \$97.59.

The moral is clear: if a bond always sold at the same yield throughout its life, its price would rise steadily toward face value as it approached maturity.

A bond's yield, however, is unlikely to be constant over time. Instead, it will fluctuate for two reasons: (1) the yield curve may change, and (2) the bond will "roll down" along the yield curve. Let's look at each of these factors.

Changes in the Yield Curve

Bonds are issued through auctions in which yields are bid. The yield determined at auction on a new bond will depend on the level of interest rates prevailing at the moment of the auction. The reason is straightforward. Investors who want to buy bonds at the time of a Treasury auction have two alternatives: to buy new bonds or to buy existing bonds from dealers. Investors will not accept a lower yield for new bonds than that available on existing bonds; nor will they demand a substantially higher yield because they would be underbid by others trying to earn a slightly better return than that available on existing securities.

However, the level of interest rates is not constant over time. It rises and falls in response to changes in economic activity, the demand for credit, investors' expectations, and monetary policy as set by the Federal Reserve System. Figure 4.2, which plots rates on 6-month T-bills for the period 1980 through 2004, portrays vividly the volatility of short-term interest rates. It shows both the sharp ups and downs that occurred as the Fed successively eased and tightened interest rates and the myriad of smaller fluctuations over the period in response to short-lived changes in other determinants of these rates.

As we have seen, the price of a bond moves in the opposite direction of the interest rate available on equivalent securities. If interest rates fall

FIGURE 4.2

Interest rates on 6-month T-bills



after a bond is issued, this bond would yield more than new bonds issued at the same interest rate if its price did not change. Therefore, buyers will compete for the existing bond, and in doing so, they will drive up its price and thereby force down its yield until the bond sells at a rate of discount equal to the new, lower going interest rate. Conversely, if short-term rates rise after a bond is issued, the unwillingness of buyers to purchase any bond at a yield less than that available on new issues will drive down its price and thereby force up its yield.

Roll Down

Even if the yield curve is unchanged, a bond's yield will change as it "rolls down" the yield curve and approaches maturity. For example, assume 2-year yields are currently 5%, and the 1-year yield is 4%. Therefore, even if the yield curve does not change over time, the yield on a 2-year bond will fall from 5% to 4% one year from now, when it will effectively become a 1-year bond.

PRICE VOLATILITY

We have seen that the price of all bonds, both zero-coupon and coupon-bearing, moves inversely with respect to the yield. But what determines the volatility of bond prices to shifts in the yield curve?

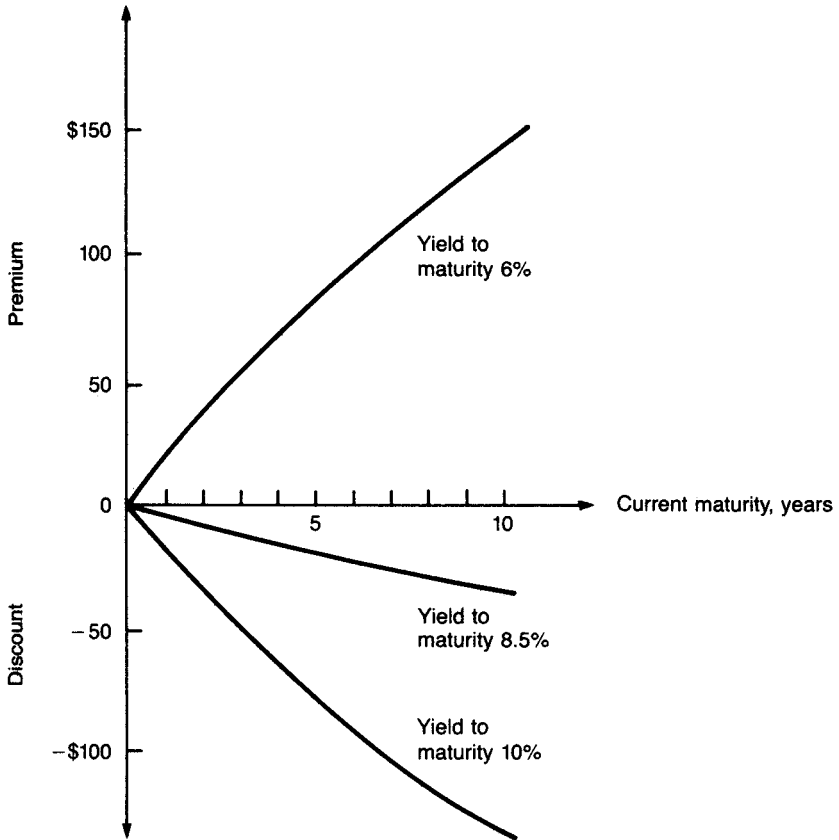
Current Maturity and Price Volatility

As explained earlier, the longer the maturity of a bond, the greater its price volatility for a given change in the yield. The distant cash flows of a long-maturity bond are particularly sensitive to yield changes, since the yield is compounded over a large number of periods when calculating the present value of each cash flow.

As these observations suggest, when prevailing interest rates change, prices of long coupons respond more dramatically than prices of short coupons. Figure 4.3 shows this sharp contrast. It pictures, for a \$1,000 note carrying an 8% coupon, the relationship between *current* maturity and the discount that would prevail if the yield on comparable securities rose to 8.5% or to 10%. It also plots the premium to which a \$1,000 note with an 8% coupon would, depending on its current maturity, be driven if the yield on comparable securities fell to 6%.

FIGURE 4.3

Premiums and discounts at which a \$1,000 note with an 8% coupon would sell, depending on current maturity, if market yields on comparable securities were 6%, 8.5%, and 10%



Coupon and Price Volatility

The volatility of a note or bond's price in the face of changing interest rates also depends on its coupon; the *lower* the coupon, the *greater* the percentage of change in price that will occur when rates rise or fall. To illustrate, consider two bonds with 4-year current maturities. Bond H has an 8% coupon; Bond J a 6% coupon. Both are priced to yield 8%. Suppose now that interest rates on comparable securities rise to 10% (the Fed tightens). Bond H will fall in price by \$6.46; since it was initially priced at

\$100, that works out to a 6.46% fall in value. Bond J's dollar price drops from \$93.27 to \$87.07—a \$6.19 fall, which equals a 6.64% loss of value. The reason for the greater percentage fall in the price of the low-coupon note is that principal repayment represents a greater proportion of total promised cash flows (principal plus coupon interest) on the low-coupon bond than on the high-coupon bond. Since the principal repayment is the most distant cash flow, and more distant cash flows are more sensitive to yield changes as explained above, the low-coupon bond is more volatile.

ADVANCED TOPICS

The final part of this chapter considers advanced topics related to bonds.

Call and Refunding Provisions

Once a bond issue is sold, the issuer might choose to redeem it early. For example, if interest rates fell, the borrower could reduce her interest costs by refunding her loan; that is, by paying off outstanding high-coupon bonds and issuing new lower-coupon bonds.

For the investor, early repayment on a bond is almost always disadvantageous because a bond issuer will rarely be tempted to repay early when interest rates are rising, a time when it would be to the bondholder's advantage to move funds out of the issuer's bonds into new, higher-yielding bonds. On the other hand, early payment looks attractive to the issuer when interest rates are falling, a time when it is to the investor's advantage to keep funds invested in the issuer's high-coupon securities.

To protect investors making long-term commitments from frequent refundings by borrowers out to minimize interest costs, most bonds contain call and refunding provisions. A bond issue is said to be *callable* when the issuer has the option to repay part or all of the issue early by paying some specified redemption price to bondholders. Most bonds offer some call protection to the investor. Some are noncallable for life; others, for some number of years after issue.

Besides call protection, many bonds offer refunding protection. Typically, long-term industrial bonds are immediately callable but offer 10 years of protection against calls for refunding. Such bonds are referred to as *callable except for refunding purposes*. If a bond offered refunding

protection through 2010, that would be indicated on a dealer's quote sheet by the symbol NR10.

Call provisions usually specify that the issuer who calls a bond must pay the bondholder a price above face value. The difference between the repurchase price and face value is known as the *call premium*. It frequently equals the coupon rate on early calls and then diminishes to zero as the bond approaches maturity.

Price Quotes

Bond prices are quoted in slightly different ways depending on whether they are selling in the new issue or the secondary market. When notes and bonds other than governments are issued, the price at which they are offered to investors is normally quoted as a *percentage* of face value. To illustrate, the corporate subordinated notes announced in Figure 4.4 were offered at a price of 97.994%, which means that the investor had to pay \$97.994 for each \$100 of face value. This percentage price is often called the bond's *dollar price*.

Once a note or bond issue is distributed and trading in it moves to the secondary market, prices are also quoted on a percentage basis but always, depending on the security, in 32nds, 8ths, 4ths, or halves. Table 4.1 reproduces quotes from the *Wall Street Journal* on U.S. Treasury STRIPS on July 12, 2005. For the August 2005 maturity, the bid price is 99-23, corresponding to \$99.72 per \$100 of par value.

Dirty and Clean Prices

There is an additional complexity with respect to note and bond pricing. Typically, interest on bonds is paid to the holder semiannually on the coupon dates. This means that the value of a coupon security rises by the amount of interest accrued as a payment date approaches and falls thereafter by the amount of the payment made. Since bonds are issued on every business day and consequently have coupon dates all over the calendar, the effect of accrued interest on the value of coupon securities would, if incorporated into the prices quoted by dealers, make meaningful price comparisons between different issues difficult. To get around this problem, quoted dollar prices always exclude any accrued interest: they are known as *clean prices*. The actual money that changes hands in the new issue and secondary markets is always the quoted dollar price *plus* any

FIGURE 4.4**Pricing announcement for subordinated notes**

This announcement is under no circumstances to be construed as an offer to sell or as a solicitation of an offer to buy any of these securities. The offering is made only by the Prospectus.

New Issue **March 2, 1989**

\$200,000,000

BANK ONE

BANC ONE CORPORATION

9 $\frac{7}{8}$ % Subordinated Notes due March 1, 2009

Price 97.994%
(Plus accrued interest, if any, from March 9, 1989 to the date of delivery.)

Copies of the Prospectus may be obtained in any State in which this announcement is circulated from only such of the undersigned or other dealers or brokers as may lawfully offer these securities in such State.

Merrill Lynch Capital Markets

Goldman, Sachs & Co.

Dean Witter Reynolds Inc.

accrued interest: this is known as a *full* or *dirty price*. For example, if an investor three months before a coupon date bought \$100,000 of 8% Treasury notes quoted at 100, she would pay \$100,000 plus \$1,980 [= $(1.04^{1/2} - 1)\%$] of accrued interest.

Calendar Conventions

For Treasury debt securities, interest is accrued on an actual/actual basis; interest accrual is calculated on the actual number of days elapsed since

TABLE 4.1

Selected quotes on U.S. Treasury STRIPS, July 12, 2005

Maturity	Bid	Ask
August 2005	99-23	99-24
October 2005	99-06	99-07
November 2005	98-30	98-30
January 2006	98-15	98-16

the last coupon payment, divided by 365 (the actual number of days in a year).

For corporate, municipal, or agency bonds, interest is accrued on a 30/360 basis: as if each month has 30 days, and the year has 360 days. Thus, for example, such securities accrue no interest on October 31, but accrue three days' worth of interest on February 28.

For money market instruments, interest is accrued on an actual/360 basis.

Duration and Convexity

In this chapter, we treat two bond-market concepts that often appear in money market discussions: duration and convexity.

DURATION

The concept of duration has gained much attention among portfolio managers, traders, and other money market participants. In particular, duration calculations are widely used in immunizing portfolios, in hedging trading positions, in comparing investment alternatives, and in performing various other analyses. Duration has become a key measurement for fixed-income securities; and it is a key element in the investment decision-making process.

It's impossible to derive results concerning duration without using simple calculus. A nonmathematical reader, willing to accept such results on faith, can easily follow our discussion of duration with no loss of continuity. Proofs of all results presented in this chapter can be found in Stigum and Robinson's *Money Market & Bond Calculations* (McGraw-Hill, 1996). For ease of reference, we present in the box on page 86 all of the notations used in this chapter. All math used is limited to *simple algebra*.

The author would like to thank Lawrence Ng for his collaboration in writing this chapter.

List of Principal Symbols Used in Chapter 5*

c	coupon rate (<i>as a decimal</i>)
D	duration
D'	modified duration
$\mathcal{P}_i$	payment received at the end of year i
P	the price (per \$1 of face value) at which a coupon security trades
PV	present value
t_i	time, measured in years, to the receipt of payment $\mathcal{P}_i$
v_{32}	yield value of $\frac{1}{32}$ †
v_{01}	price value of an 01†
w	weighted average of time periods (of t_i)
y	yield to maturity (<i>as a decimal</i>)
Δ	change in a variable (e.g., ΔP denotes change in price)

*We use a few subscripts. There is nothing mathematical about them as they denote names, not operations. To illustrate, suppose we want to represent in symbols the Hanson family, composed of Helen, Peter, and Marcia. A mathematician would observe that the important identifying characteristic of the group is that they are all Hansons; and to identify the individuals in the group, he would use subscripts as follows: H_h for Helen Hanson, H_p for Peter Hanson, and H_m for Marcia Hanson. *Moral:* If you understand how surnames and given names are used, you understand all you need to know about subscripts.

†The concepts, the yield value of $\frac{1}{32}$ and the price value of an 01, were introduced in Chapter 4.

The Concept

A bond's current maturity gives a notion of the *futurity* of the cash flows that it will throw off over time; clearly, the owner of a 20-year bond will have to wait 10 years longer for a payback of principal than will the owner of a 10-year bond. Nonetheless, current maturity is an *imperfect* measure of futurity.

Table 5.1 illustrates this; it describes the cash flows (*per \$1 of face value*) thrown off by three different notes, all having a 3-year current maturity.¹ Note A is a zero-coupon security, and the futurity of its cash flow clearly coincides with its current maturity, three years. But if this is so, then, since note B

¹ Because bonds are priced as so many dollars per \$100 of face value, it's standard practice, in deriving bond formulas, to express all variables per \$100 of face value. Doing so, however, forces one to do a lot of confusing dividing through and multiplying by 100. It's far easier to work, as we do, with all variables expressed per \$1 of face value and yields expressed as decimals.

TABLE 5.1

Cash flows generated, *per \$1 of face value*, by three different 3-year notes

	Year 1	Year 2	Year 3
Note A	0.00	0.00	1.00
Note B	0.10	0.10	1.10
Note C	0.20	0.20	1.20

pays significant amounts of coupon interest in years 1 and 2, the futurity of its cash flow must be something less than three years; and the futurity of note C's cash flow must be still less, since it pays yet more coupon interest.

Clearly, we need an alternative measure of futurity. One approach would be to calculate, for a note or bond, a *weighted average* of the *time periods* an investor must wait to receive all promised cash flows. Specifically, we could calculate a *weighted average* of the *time periods* in which cash flows occur, with the *weights* being the *cash flows* that actually occur in each time period. To illustrate, let

w = weighted average of time periods

t_i = time, measured in years to the receipt of payment $\mathcal{P}_i$

$\mathcal{P}_i$ = payment received at t_i

Then, for a 3-year note, such a weighted average is given by the following expression:

$$w = \frac{\mathcal{P}_1 t_1 + \mathcal{P}_2 t_2 + \mathcal{P}_3 t_3}{\mathcal{P}_1 + \mathcal{P}_2 + \mathcal{P}_3}$$

which, if one uses a *sum sign*, reduces to:²

$$w = \frac{\sum_{i=1}^3 \mathcal{P}_i t_i}{\sum_{i=1}^3 \mathcal{P}_i}$$

²Note, the *sum sign*, $\sum_{i=1}^3$, is simply a convenient abbreviation that says, "Add these terms using appropriate values in each of *three* time periods."

TABLE 5.2

The weighted-average time to payment, w , of the cash flows generated by each of the notes described in Table 5.1

I. The formula:

$$w = \frac{\sum_{i=1}^3 \mathcal{P}_i t_i}{\sum_{i=1}^3 \mathcal{P}_i}$$

II. The calculations:

$$\text{Note A: } w = \frac{0+0+(1)(3)}{0+0+1} = \frac{3}{1} = 3$$

$$\text{Note B: } w = \frac{(0.1)(1)+(0.1)(2)+(1.1)3}{0.1+0.1+1.1} = \frac{3.6}{1.3} = 2.77$$

$$\text{Note C: } w = \frac{(0.2)(1)+(0.2)(2)+(1.2)3}{0.2+0.2+1.2} = \frac{4.2}{1.6} = 2.63$$

If we use this formula to calculate the average waiting time to payment for the notes described in Table 5.1, we get the results shown in Table 5.2. As we'd expect, the futurity—by this measure—of A's cash flow (3 years) exceeds the futurity of B's cash flow (2.77 years), which in turn exceeds the futurity of C's cash flow (2.63 years).

Present Value

In seeking to measure the futurity of a stream of payments, we have, however, neglected something important. *So long as interest rates differ from zero, dollars to be received in different periods differ in value.* To allow for this, we must introduce the concept of *present value*.

Suppose that someone offered to "sell" you \$1 for delivery today. Obviously, the dollar offered would be worth exactly \$1. A more interesting question is: What would \$1 to be delivered one year from now be worth? As a moment's thought suggests, it would be worth whatever *principal* you would have to invest today in order that principal *plus* accrued interest equal \$1 in one year.

Let

I = principal invested

i = simple interest rate (as a decimal) available on a 1-year investment

Then, by solving the expression,

$$I + iI = \$1$$

for I , we can determine that the *present value* (PV), as it's called, of \$1 to be received one year from now is given by

$$PV = \frac{\$1}{(1+i)}$$

Note several things about present value. First, it is a *discounted* value of a future sum. Second, i is the rate at which this sum is discounted. Third, the higher i , the smaller is the present value of the future sum.

Naturally, *the more years one must wait to get \$1, the less it will be worth today, that is, the smaller its present value will be*. By continuing the approach we use above, we could easily show that the present value of \$1 to be received *two* years hence is given by the expression

$$PV = \frac{\$1}{(1+i)^2}$$

Also, and more generally, the present value of \$1 to be received some indefinite number of years, n , hence is given by the expression

$$PV = \frac{\$1}{(1+i)^n}$$

MACAULAY'S DURATION

Once we think in terms of present value, it's clear that the mean waiting time to payment, w , that we calculated above is flawed because it averages apples and oranges—dollars to be received in different periods. To correct for this, we must use as weights not the dollars to be received in each period, but rather the present values of these dollars. This approach gives us a measure of futurity known as *duration* (or *Macaulay's duration*, after its author).

In developing a formula for duration, we consider, for the sake of simplicity, a note or bond that pays coupon interest only *once a year*, at the end of the year. Also, in calculating the present values of the cash flows thrown off by the security, we follow the standard approach for pricing a bond; namely, we *discount all cash flows in all periods at the yield to maturity at which the security currently trades*. For an investor who wants to know how much money he'd have by the time a bond matured if he bought that bond today and reinvested all coupons paid before maturity, this approach is equivalent to the investor assuming that he'd be able to reinvest every coupon at a rate equal to the bond's current yield to maturity. For him to be able to do that, the yield curve would have to be *flat* and *constant over time*, a pretty strong assumption, especially given that the yield curve tends to slope upward (but nonetheless one that the Street often makes in various calculations). Let

D = duration

c = coupon rate (as a decimal)

t_i = time in years to the receipt of payment $\mathcal{P}_i$

y = yield to maturity (as a decimal)

Then the duration of a note—again we use a 3-year note—can be written in symbols as follows:³

$$D = \frac{\left(\frac{c}{(1+y)}\right)t_1 + \left(\frac{c}{(1+y)^2}\right)t_2 + \left(\frac{c+1}{(1+y)^3}\right)t_3}{\frac{c}{(1+y)} + \frac{c}{(1+y)^2} + \frac{c+1}{(1+y)^3}}$$

In this expression, $(c + 1)$ represents the note's cash flow, per \$1 of face value, in year three, the year in which principal is repaid. Also, since we're considering a 3-year note, $t_1 = 1$, $t_2 = 2$, and $t_3 = 3$.

Finally, an important observation: The denominator in our expression for the duration of a note equals the sum of the present values of the note's cash flows in different periods; this sum in turn equals the price (P)

³ Note a number or expression written next to another expression in parentheses, small or large, means multiply the one by the other.

that a rational investor would pay for the note.⁴ Thus, for a 3-year note that pays interest annually, duration can be rewritten as follows.

Let

P = the price (per \$1 of face value) at which a bond trades

Then,

$$D = \frac{1}{P} \left(\frac{1c}{(1+y)} + \frac{2c}{(1+y)^2} + \frac{3(c+1)}{(1+y)^3} \right)$$

Using the expression we've just obtained for duration, we can now calculate the duration of each of the 3-year notes described in Table 5.1. The results of these calculations are given in Table 5.3. A comparison of the numbers in Tables 5.2 and 5.3 shows that the addition of present value to our calculation of the futurity of the cash flows thrown off by a note *lowers* the number obtained. This makes sense, since *the present value of a future sum is always smaller than that sum*.

TABLE 5.3

The weighted-average time to payment, w , of the cash flows generated by each of the notes described in Table 5.1

Formula used is that given above; all three notes are assumed to be trading at a yield to maturity, y , of 8%

$$\text{Note A: } D = \frac{0 + 0 + 3 \left(\frac{1}{(1+0.08)^3} \right)}{0 + 0 + \frac{1}{(1+0.08)^3}} = 3$$

$$\text{Note B: } D = \frac{1 \left(\frac{0.1}{(1.08)^1} \right) + 2 \left(\frac{0.1}{(1.08)^2} \right) + 3 \left(\frac{1.1}{(1.08)^3} \right)}{\frac{0.1}{(1.08)^1} + \frac{0.1}{(1.08)^2} + \frac{1.1}{(1.08)^3}} = 2.74$$

$$\text{Note C: } D = \frac{1 \left(\frac{0.2}{(1.08)^1} \right) + 2 \left(\frac{0.2}{(1.08)^2} \right) + 3 \left(\frac{1.2}{(1.08)^3} \right)}{\frac{0.2}{(1.08)^1} + \frac{0.2}{(1.08)^2} + \frac{1.2}{(1.08)^3}} = 2.59$$

⁴ See Stigum and Robinson's *Money Market and Bond Calculations* (McGraw-Hill, 1996).

From our expression for duration, D , it's easy to generalize that, for a security yielding annual payments, $\mathcal{P}_i$, in any or all of n years, duration is given by the expression:

$$D = \frac{1}{P} \left(\sum_{i=1}^n \frac{t_i \mathcal{P}_i}{(1+y)^i} \right)$$

where i denotes through the i^{th} year.

This expression in turn can be modified to allow for a security that pays coupon interest *semiannually*, but we need no such general expression to continue our discussion. Because duration calculations become messy, no one does them manually; every trader either has a programmed computer into which he plugs the issue, the price, and the settlement date, or has a software system that identifies the characteristics of a bond and automatically computes the duration level.

Determinants of Duration

From our equation for duration, it's clear that the duration of a note or bond depends on *three* variables: (1) its current maturity; (2) its coupon, c ; and (3) its yield to maturity, y , at which future cash flows from it are discounted.

As intuition and the numbers in Tables 5.2 and 5.3 suggest, the duration of a security will, *all else constant*, be *higher* the *longer its current maturity*, the *lower its coupon*, and the *lower the yield* at which it currently trades.⁵

Since our topic is the money market, we pause to note that many money market securities are in effect *zero-coupon* securities. This is true of bills, BAs (bankers' acceptances), short-term CDs, commercial paper, muni notes, Treasury STRIPS (separate trading of registered interest and principal of securities), as well as corporate, agency, and Treasury notes and bonds that are in their last coupon period. *The duration of every zero-coupon security equals its current maturity.*

⁵ Duration is a function of three variables. Thus, our saying *all else constant* is equivalent in mathematical terms to our saying, "If we took the partial derivatives of duration with respect to each of these three variables, the signs of the expressions we'd get would be *positive* for the partial derivatives with respect to maturity and to yield to maturity, *negative* for the partial derivative with respect to coupon."

Duration and Price Sensitivity

To understand how duration is used, we must examine its relationship to price and yield. This relationship is easily derived mathematically, but most Street people take it on faith.⁶ Let

Δ = change in a variable,

then, the relationship between duration and yield is as follows:

$$\frac{\Delta P}{\Delta y} = -D \frac{P}{(1 + y/2)}$$

The left side of the equation, $\Delta P/\Delta y$, is the rate of change of the security's price with respect to its yield. Specifically, it is the relationship between a change in a security's yield to maturity and the impact of that change on the security's price. This relationship is sometimes referred to as the *risk* of a security.

Rearranging terms in the above equation, we get

$$\frac{\Delta P}{P} = \left(\frac{-D}{(1 + y/2)} \right) \Delta y$$

Starting the equation for duration this way tells us something important: The percentage change in a note's price, $\Delta P/P$, created by a change in its yield, Δy , is directly proportional to its duration. In other words, duration is a measure of the price sensitivity of a note or bond to a change in the yield at which it trades; and it is for this reason that duration is so widely used in the financial community. Investors depend upon duration to assess the risk profile of their portfolios.

MODIFIED DURATION

To simplify duration-based calculations, most Street people work not with duration but with what's called *modified duration*. Let

D' = modified duration

⁶ For a derivation of this result, see Stigum and Robinson's *Money Market and Bond Calculations* (McGraw-Hill, 1996).

Then, modified duration is defined as follows:

$$D' = \frac{D}{(1 + y/2)}$$

Substituting this expression for D' into the expression we earlier gave for $\Delta P/\Delta y$,

$$\frac{\Delta P}{\Delta y} = -D \frac{P}{(1 + y/2)}$$

we get

$$\frac{\Delta P}{\Delta y} = -D'P$$

By rearranging terms, we can restate this result as follows:

$$\frac{\Delta P}{P} = -D' \Delta y$$

Note that modified duration, D' , is simply an algebraic manipulation of duration, D ; thus, D' implies nothing more or less profound than D does. The sole reason people work with D' , instead of with D , is to save themselves the trouble of having to divide through by $(1 + y/2)$.

Using Modified Duration

Table 5.4 gives quotes on selected Treasury issues as of May 2006, a time when the yield curve happened to be relatively flat. Recalling the expression,

$$\frac{\Delta P}{P} = -D' \Delta y$$

we can, using the figures given in Table 5.4 for D' , easily calculate how a 10-bp change in yield would affect the prices of several of the issues

TABLE 5.4

Quotes on selected Treasury securities for settlement
May 5, 2006

Coupon	Maturity	Price	Yield	Modified Duration	Yield Value of $1/32$
$2\frac{1}{2}$	10/31/2006	98-25	5.030	0.47	0.06658
$4\frac{7}{8}$	04/30/2008	99-26	4.967	1.87	0.01673
$4\frac{1}{2}$	02/15/2009	98-24	4.980	2.56	0.01226
$4\frac{7}{8}$	04/30/2011	99-10+	5.030	4.37	0.00719
$4\frac{1}{2}$	02/15/2016	95-01	5.152	7.68	0.00423
$4\frac{1}{2}$	02/15/2036	88-29+	5.238	15.31	0.00227

quoted in this table. Specifically, our formula tells us that a 10-bp *rise* in the yield on the $4\frac{1}{2}$ of 2036 would cause its price to *fall* by 1.531%:

$$\begin{aligned}
 \frac{\Delta P}{P} &= -(15.31)(0.001) \\
 &= -0.01531 \\
 &= -1.531\%
 \end{aligned}$$

In contrast, a 10-bp *rise* in the yield on the $4\frac{7}{8}$ of 2008 would cause its price to *fall* by only 0.187%:

$$\begin{aligned}
 \frac{\Delta P}{P} &= -(1.87)(0.001) \\
 &= -0.00187 \\
 &= -0.187\%
 \end{aligned}$$

THE YIELD VALUE OF $1/32$

Starting with either an issue's duration or its modified duration, we can easily compute two other frequently quoted bond statistics: (1) the yield value of $1/32$ and (2) the price value of an 01 (i.e., the price value of a 1-bp change in yield).

Treasury coupons are quoted in points and 32nds of a point. *The yield value of $1/32$ measures the amount by which the yield on such a security would change if its price changed by $1/32$.* Although the relationship between a change in an issue's price and the resulting change in its yield is *negative*, the yield value of $1/32$ is always quoted as a *positive* number. Street people automatically know that, as yields *rise*, bond prices *fall*. Let

$$v_{32} = \text{yield value of } 1/32$$

Then, substituting $1/32$ for ΔP and v_{32} for ΔY into the equation

$$\frac{\Delta P}{P} = -D' \Delta y$$

we get

$$\frac{1/32}{P} = -D' v_{32}$$

Next, we solve this expression for v_{32} and, following Street practice, we delete the minus sign.

Mathematically, the way we do this is to put *brackets* around the term $1/D'$; these brackets indicate that we are considering the *absolute value* of $1/D'$. A number's absolute value is always greater than or equal to zero: unless a number is zero, its absolute value is *positive*. The above steps give us:

$$v_{32} = \frac{1}{32P} \left[\frac{1}{D'} \right]$$

A Numerical Example

Consider again the $4\frac{7}{8}$ of 2008. Substituting 99-26 for P and 1.87 for D' into our expression for v_{32} , we get

$$\begin{aligned} v_{32} &= \frac{1}{32(99.8125)} \left[\frac{1}{1.87} \right] \\ &= 0.00016 \\ &= 0.017\% \\ &= 1.70 \text{ bps} \end{aligned}$$

The number we've calculated for the yield value of $1/32$ on the $4\frac{7}{8}$ of 2008 differs by 0.00027 from the number given in Table 5.4, presumably because of the rounding in this table of the number given for modified duration.

In Chapter 4, we noted that the yield value of $1/32$ is—for intuitively obvious reasons—smaller, the longer is its current maturity. The figures quoted in the last column of Table 5.4 provide a dramatic illustration of this.

THE PRICE VALUE OF AN 01

Like the yield value of $1/32$, the price value of an 01 is a measure of an issue's price sensitivity. However, this measure gives the change in price, *measured in 32nds*, that will occur if an issue's yield changes by 1 bp. Let

$$v_{01} = \text{price value of } 1/32$$

To obtain an expression for v_{01} , we begin with our expression for $\Delta P/P$,

$$\frac{\Delta P}{P} = [-D'] \Delta y$$

If we substitute v_{01} , *measured in 32nds*, for ΔP , we get

$$\frac{v_{01}}{32P} = [-D'](1 \text{ bp})$$

Next, solving this expression for v_{01} , we get

$$\begin{aligned} v_{01} &= (32P)[-D'](1 \text{ bp}) \\ &= (32P)[-D'](0.0001) \\ &= 0.0032P[-D'] \end{aligned}$$

Finally, we note that if one knows the yield value of $1/32$ for a security, it's easy to calculate the price value of an 01 for that security. Simple manipulation of our expressions for v_{32} and v_{01} shows that, for any coupon security,

$$v_{01} = \frac{0.001}{v_{32}}$$

The Relationship of Duration to Current Maturity

The figures in Table 5.4 indicate that, as we'd expect, a security's modified duration is longer, the longer is its current maturity. What's surprising is that an issue's modified duration is so much shorter than its current maturity. To obtain, in the yield environment prevailing on May 4, 2006, an issue with a modified duration of 15.31 years, a portfolio manager would have had to buy the most recently issued 30-year bond, which was issued in February 2006.

Later, we discuss the stripping of Treasury coupons into a series of zeros (Chapter 14). A big attraction of zeros to an investor is that if he buys, say, a zero that corresponds to the corpus of a 20-year maturity, he'll get a security with duration of 20 years. No coupon security he could buy would offer him duration of that length.

Uses of Duration by a Portfolio Manager

Consider a portfolio manager who holds various fixed-income securities. He'd like to be able to answer the question: "What will happen to the market value of my portfolio if interest rates rise or fall by X basis points?" He knows what amounts of different securities he owns, what coupons these securities pay, and what prices these securities currently command. Thus he can easily calculate duration for each of his securities; and having done that, he can determine *approximately* what *total* capital gain (or loss) he would experience on his portfolio if market rates were to fall (or rise) by X basis points.

We say "approximately" because, when the market moves, yields on different securities never move, *pari passu*, precisely the same number of basis points. Yields on individual securities, with their individual characteristics, may, when the market moves, change more, less, or not at all. Also, if the slope of the yield curve changes—say, it inverts—while our investor owns securities having widely varying maturities, a duration-based estimate of how a change in yields would affect the value of his portfolio isn't likely to help him much. Like other useful analytic tools, duration has its *limitations*. Where duration is very helpful is to a portfolio manager who wants to immunize his portfolio.

Use of Duration to Track Market Sentiment

There's another important way in which portfolio managers can utilize duration when formulating investment decisions. Duration can be used as

a gauge of market sentiment, which can serve as a useful gauge of the future direction of bond prices. In theory, if everyone is bullish, the market is more likely to fall. Conversely, if everyone is bearish, the market is likely to rise. Market history is strewn with periods in which this time-tested theory has proved true. The demise of the dot-com stocks is the most recent and dramatic example of this.

The reason why extremes in market sentiment typically portend market reversals is fairly simple. If the preponderance of investors is either very bullish or very bearish, this most likely means that market prices fully reflect sentiments about the market's underlying fundamentals. In other words, extreme bullishness or bearishness tends to reflect the digestion of and reaction to bullish or bearish news, respectively, in the past, present, and near future. Therefore, if news rolls in that runs counter to the prevailing market sentiment, market prices could be vulnerable to a reversal if the news does not fit with investors' notions of a perfect world.

Extreme sentiment can occur in any market, including the bond market in which tracking market sentiment is helped immensely by tracking the collective duration levels of fixed-income portfolios. Since the bond market is largely an institutional business, aggregate duration surveys conducted by Wall Street firms and economic research firms are a microcosm of the risk profiles of the universe of fixed-income portfolios. Indeed, most duration surveys include portfolios that have a combined total of several hundred billion dollars or more in assets. The best and most reliable aggregate duration survey is conducted weekly by Stone and McCarthy Research Associates (www.smra.com). That survey historically has had the best correlation to turning points in the bond market and therefore appears to capture market sentiment accurately.

When portfolio managers are bullish on bond prices, they increase their portfolios' duration to above the duration of their benchmark—the index their performance is judged against—so that if bond prices rise, their portfolios will outperform the market. Similarly, when portfolio managers are bearish, they decrease their duration below that of their benchmark, hoping to outperform the benchmark on the way down.

Using aggregate duration surveys to spot extreme market sentiment is simple. When aggregate duration falls below 100%, this suggests that in the aggregate portfolios are short. The farther aggregate duration falls below 100%, the shorter portfolios are. At 95%, which tends to be the lower end of the long-term range for most duration surveys, bearishness

abounds and market sentiment could be considered to be at an extreme. In this case the market is likely to be extremely oversold and ripe for a reversal. When aggregate duration is at 105%—the upper bound for the surveys—bullishness abounds and the market probably is extremely overbought and set to fall.

IMMUNIZING A PORTFOLIO

Consider a portfolio manager who needs money to fund a specific, known, dollar liability on some specific future date or to fund some set of liabilities on some set of specific future dates. Lots of institutions—pension funds, insurance companies that sell guaranteed investment contracts, and state lotteries that make multiyear payouts to winners, to name but a few—all face this situation.

If a portfolio manager must fund a liability on a future date, that date is referred to in bond-market lingo as his *investment horizon*. In bygone days, a portfolio manager who had to fund a \$10 million liability coming due in 10 years, might have said, “Simple. I’ll buy 10-year notes. Currently, they’re selling at a yield of Y , so if I buy $\$X$ million of them [and reinvest coupon interest at Y], I’ll have \$10 million in 10 years.”

Unfortunately, life isn’t that simple. Our portfolio manager’s problem is that if, over time, rates go down, the coupon interest that he reinvests won’t grow at as high a compound rate as he thought it would. (Of course, if rates fall, that will cause his bonds to rise in price, but that won’t do him any good if he’s planning, as he is, to hold his bonds to maturity.) Net, rates falling will cause our portfolio manager to be underfunded. Conversely, rates rising will cause our portfolio manager to be overfunded—for him, an easier problem with which to deal.

What our portfolio manager wants is certainty: he wants to know that if he invests X today, he can count on having X' at the end of his investment horizon. Enter duration. There’s a well-known theorem, which we won’t attempt to prove here, that states basically this: If a portfolio manager buys, to fund a future liability, securities that have the same duration (as opposed to the same current maturity) as does the future liability he’s funding, then it’s safe for him to reason: “I need \$10 million in 10 years. Securities with a duration of 10 years are currently selling at a yield of Y , so if I buy $\$X$ million of them [and reinvest coupon interest at Y], I’ll have \$10 million in 10 years.”

Intuitively, this theorem identifies duration as a sort of fulcrum point on the maturity spectrum. The theorem tells the portfolio manager to buy, at this fulcrum point, securities with a current maturity that far exceeds his investment horizon. If he does this and interest rates then drop, he will lose some reinvestment income that he was counting on, but offsetting this loss, he'll have an equal capital gain: when he gets to his investment horizon, he'll be able to sell his bonds at a capital gain that he was not counting on. Net, if he matches the duration of his assets with that of his future liability, the interest-income loss he wasn't counting on will be precisely matched by the capital gain he also wasn't counting on; and he will have the \$10 million or whatever he needs on the date he needs it. Alternatively, if rates rise rather than fall, our portfolio manager earns more interest income than he counted on, but he suffers a precisely offsetting capital loss when he sells his bonds. Either way—interest rates go up or down—our portfolio manager gets certainty by matching the duration of his assets with that of his liabilities.

In a nutshell, what we have been talking about is the use by the portfolio manager of duration as a tool to mitigate the uncertainty that surrounds his long-term investment results caused by *reinvestment risk*, the portfolio manager's inability to predict the future rates at which he will be able to reinvest future coupon interest.

Put another way, a portfolio manager who, to fund a future liability due on a known future date, selects assets whose duration matches that of his liability is creating a portfolio in which *his reinvestment risk will precisely balance (offset) his market risk*.

Duration sounds like a dandy way out of uncertainty. However, a portfolio manager funding a 10-year liability can't just duration-weight his assets in year one and play golf for the next nine. As time passes and as market conditions change, the duration of the assets he owns will change. To offset that and to thereby preclude the incursion of unwanted uncertainty in his investment results, our portfolio manager must periodically readjust, *rebalance* in financial jargon, his portfolio.

The one surefire way for a portfolio manager to match fund a future liability is to buy *zero-coupon securities*. A portfolio manager who invests \$X million today in 10-year zeros to fund a liability due 10 years hence has total certainty, to the penny, about what funds will be available to him on his horizon date. (Of course, if our portfolio manager invests not in Treasuries, but in corporates, he'll have credit risk. However, that's a different issue from the one we're discussing.

If a portfolio manager buys bonds that expose him to credit risk, no amount of duration analysis can help him neutralize the resulting credit risk.)

It's important to note that zeros are no exception to the theorem we paraphrased above. The duration of a zero always equals its current maturity; thus, a portfolio manager who buys 10-year zeros to fund a liability 10 years hence has, whether he thinks of it that way or not, matched the duration of his assets with that of his liabilities.

This observation correctly suggests another way to interpret funding a liability with securities of matching duration. Buying a duration-matched portfolio is like buying zeros having the same term as the liability to be funded. What is unique about a zero-coupon security bought to fund a future liability of the same term is that it exposes the holder to neither market risk nor reinvestment risk. But those are precisely the properties of a duration-matched portfolio acquired to fund a future liability having a term equal to the duration of the assets acquired.

Our comments on zeros may cause the inquisitive reader to ask: what would happen if the yield curve in the market for STRIPS, called the *term structure of interest rates*, were used instead of the yield curve in Treasury coupons to calculate duration? Some people do in fact calculate duration off of the term structure of interest rates, but they rarely publish just how they do so; such routines are usually highly proprietary because they are also used for other purposes such as pricing OTC (over-the-counter) options. In any case, it's possible to show that Macaulay's duration equals term-structure duration under the assumption that each of the term-structure discounts equals its equivalent yield-to-maturity discount. This assumption is equivalent to saying that all the discount yields for different periods must be equal, which in turn implies that the term structure must be *flat*. If the term structure is flat, then the yields to maturity implied by it are precisely the yields to maturity one would use to calculate Macaulay's duration for a coupon security.

A final point. Duration matching of assets and liabilities does not constrain a portfolio manager to buy just issues with the precise duration of each future liability he must fund. To fund any future liability on a duration-weighted basis, a portfolio manager may acquire assets of varying maturities so long as the weighted-average duration of the assets he acquires equals the duration of the liability he's funding. In calculating the

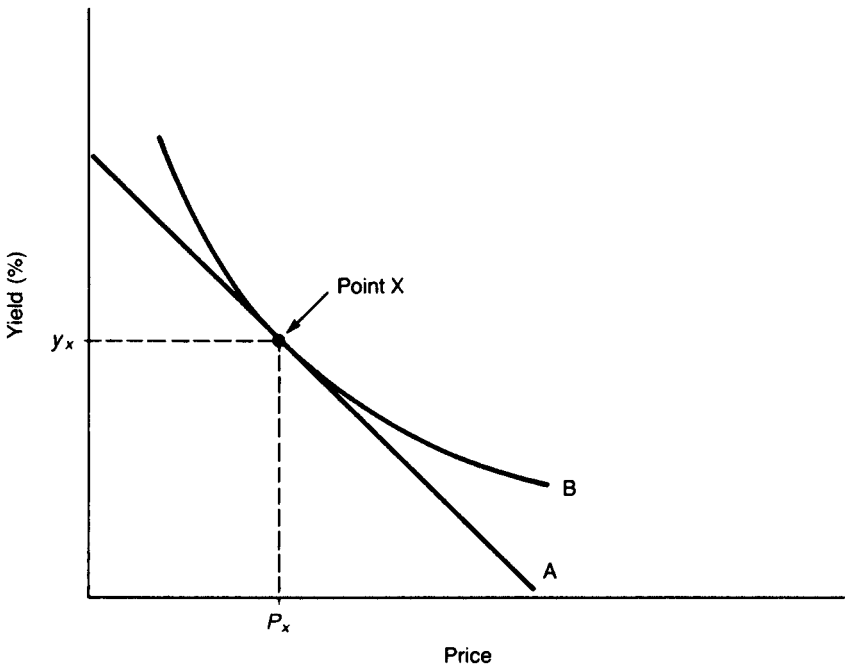
weighted-average duration of his assets, the *weights* that the portfolio manager must use are the *face amounts* of each security he acquires.⁷

CONVEXITY

Convexity is another important buzzword in the fixed-income community. In Figure 5.1, we suggest intuitively why portfolio managers prefer more

FIGURE 5.1

Price-yield curves for two securities, A and B



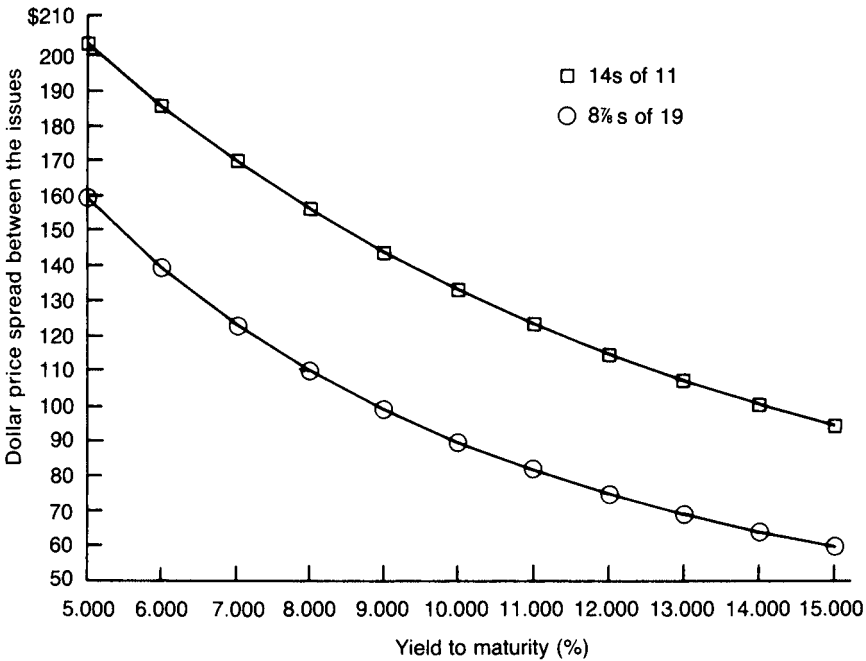
⁷ When we implicitly assumed, in calculating duration, that the yield curve was relatively flat, we also ensured that the durations of different securities would be *additive*. This means that it is correct to say that the duration of a portfolio equals the weighted-average duration of that portfolio in which the weights used are the amounts of the different securities held in the portfolio. For example, the fact that duration is additive permits us to say that, if a portfolio comprises \$500 million of securities having a four-year duration and \$500 million of securities having a six-year duration, then that portfolio's duration is five years. All the results mentioned here and above are proved in Stigum and Robinson's *Money Market and Bond Calculations* (McGraw-Hill, 1996).

to less convexity. Suppose that there exists a security A, whose payout is structured such that there's the linear relationship, pictured in Figure 5.1, between its price and the yield at which it trades.⁸ Suppose also that there exists a coupon security, B, whose payout is structured such that there's the curvilinear (*convex to the origin*) relationship, pictured in Figure 5.2, between its price and the yield at which it trades. Finally, suppose that yields on both securities are at the level y_x , and prices on both securities at the level P_x .

Which security shall the investor, poised at X, buy? There's no contest. If the investor buys security B over A and yields fall, the price of B will rise faster than will that of A. Alternatively, if the investor buys security B over security A and yields rise, the price of B will fall more slowly than will that of A.

FIGURE 5.2

Price-yield relationships for the 8⁷/₈s of 19 and the 14s of 11



⁸ Maybe the security contains some oddball options. We don't care because we just want two contrasting price-yield lines that *define to the eye* convexity.

The price-yield line for security A is a straight line that possesses *zero convexity*. The price-yield line for security B curves upward and outward from the origin. It has *positive convexity*. Clearly, all else equal—the investor gets the same yield for the same price paid and the same duration too—the investor will always prefer, among all securities, the one that offers him the most convexity.⁹

Several comments are in order about convexity. First, if an issue's price-yield curve is convex, as those of most fixed-income securities are, then for that issue, $\Delta P/P$, the slope of the price-yield curve, can't be a constant; and if it isn't a constant, then neither duration nor modified duration can be constants. But we already knew that; our formula for duration tells us that an issue's duration will change as its yield and price change; and if duration changes, then so too must modified duration. What makes duration interesting to money managers is that they assume, correctly, that it won't change much unless yields change by a lot. This is why portfolio managers are on safe ground when they assume that duration will be insensitive to *small* price-yield changes. They must always be cognizant, however, of how small differences in convexity can make a significant difference in how the prices of two issues will change in response to identical changes in yield when the price-yield ranges are *wide*.

Two other points are worth making. First, while it's true that an issue whose price-yield curve is more convex is preferable to one whose price-yield curve is less convex, the differences in convexity that in fact exist between different outstanding issues are smallish, second-order effects. Equally important, the markets have for some time recognized that, of two bonds with similar duration and yield, the higher-convexity bond will outperform the lower-convexity bond from a risk-reward standpoint. Consequently, bonds of similar durations typically are priced such that those with higher convexity offer lower yields.

Nonetheless, portfolio managers who have a bogey—the Lehman bond index, for example—try mightily to beat their bogey by constructing a portfolio of securities that, while it has *the same weighted-average duration* as the securities in the index portfolio, has *greater convexity*. Some might try to construct a portfolio with a sort of hockey-stick convexity: prices rise a lot if yields fall but won't fall much if yields rise. A portfolio

⁹ The mathematically inclined reader will note that the convexity of an issue's price-yield curve is the second derivative of yield with respect to price, that is, is the rate of change of the slope of the curve. Clearly, this rate of change is positive for issue B, because as its price increases, the slope of its price-yield relationship moves from highly negative toward zero.

manager attempting that ploy might look for securities with attached options that cause them to behave like a cushion bond: for example, securities that, because of an imbedded option, failed to rise as much as they would have—absent the option—when yields fell, and consequently won't fall as far as they otherwise would if yields now rise. Over the price-yield range in question, such a security may actually display *negative convexity*. Mortgage-backs, like GNMA's, are an example of a class of securities that display in certain markets, due to imbedded prepayment options, negative convexity.

A security that displays negative convexity, has, at least over some price-yield range, a price-yield curve that bows in toward, not out from, the origin. A mathematician would call such a price-yield curve *concave to the origin*. Only fixed-income folks, not mathematicians, have heard of negative convexity. In any case, it's obvious that negative convexity—or whatever one wants to call it—is from a portfolio manager's viewpoint, a most undesirable property for an issue's price-yield curve to display over its *entire* price-yield range.

REVIEW IN BRIEF

- Duration and convexity are key considerations in the decision to buy and sell fixed-income securities.
- Duration measures a bond's price sensitivity to changes in interest rates, although not precisely. Nevertheless, duration provides a close approximation if the interest-rate changes are small.
- Duration is calculated by summing up the weighted average maturity of a bond's future cash flows, discounting these cash flows to their present value.
- Thus the duration of a bond will be heavily influenced by a bond's coupon payments, its current maturity, and the yield to maturity at which its future cash flows are discounted.
- Duration increases with maturity length (assuming all other characteristics are the same). Bonds with high coupon rates have lower duration than do bonds with low coupon rates. The duration on a zero-coupon bond is always equal to its term to maturity.
- Convexity helps to measure the percentage change in a bond's price change for a given change in yield that cannot be explained

by duration. It is an especially important concept for investors to utilize when calculating price changes that will occur when yield changes are large.

- Duration can be used as a gauge of market sentiment, which can help fixed-income portfolio managers in the investment decision-making process.

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PART TWO

The Major Players

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The Banks: Domestic Operations

Bankers are not always widely understood or loved. In the money market, however, bankers are players of such major importance that any serious discussion of the various markets that comprise the money market must be prefaced with a careful look at banking. Nevertheless, bankers have at times had an image problem, seen as the culprits behind the high interest rates that borrowers must pay and as acting in ways that could put the financial system and the economy at risk, perhaps through the extensive use of derivatives or by lending to risky borrowers.

Both charges reflect the preference for low interest rates and a few serious misconceptions entertained by much of the public and more than a few politicians over the years. First, it is the Fed, not bankers, that sets the general level of short-term interest rates. Second, banking is risk free or, alternatively, risk-free banking is what the country needs. Third, the Fed would permit or might not be able to avoid the failure of one or more major banks, which might indeed wreak economic havoc, but it is the job of the Fed and other regulators such as the Office of the Comptroller of the Currency (OCC) to watch the financial system as a whole. None of these misconceptions is easy to correct; hence, bankers' rather intractable image problem. Nevertheless, the bankers' image is no longer as stodgy as it once was, with households and businesses increasingly seeing bankers as allies. Today, bankers are playing a broader role in the economy, with the line between banking and other parts of the financial sector having become blurred, as evidenced in part by the fall of Glass-Steagall in 1999.

Moreover, the widespread growth of branching that followed the Riegle-Neal Banking and Branch Efficiency Act of 1994 has made local banks more ubiquitous than ever, making them as familiar to households as the corner store.

A MONEY MARKET BANK

The nation's largest banks, true giants, are often referred to as *money market* or *money center banks*. The term *money market bank* is apropos, since activity in every sector of the money market is strongly influenced and in some cases dominated by these institutions. Their role has nonetheless diminished over the years. In particular, money center banks are no longer the dominant provider of liquidity for other financial industries. Nevertheless, these institutions play a pivotal role in providing funding to the financial sector *indirectly*, by providing backup facilities on commercial paper issuance (Chapter 22), for example, as well as for financial instruments that have been securitized. The money center banks also play the dominant role in the U.S. payments system, a system that helps keep both the economy and the financial markets operating. Thus, to study the money market, one must first study the great banks.

To be a money market bank has always meant to be an important participant in many traditional markets: the fed funds market; the repo market; the market for governments, agencies, mortgage-backed, and other domestic money market securities; the Eurodollar market; the foreign-exchange market; and at least some foreign domestic capital markets. Today, to be a money market bank also means to be an active participant in markets for sophisticated derivative products such as futures, swaps (coupon, credit default, and cross currency), and various option products; also, the emphasis on a global presence at such a bank has become more pronounced.

While it's easy to talk about a money market bank, it's less easy to list just which banks fall in this category. The property of being a money market bank is, like liquidity, something measured in degrees. Also, as a glance at Table 6.1 shows, the top 12 U.S. banks are a mixed bag. Some are clearly global banks; others have a strong regional flavor. The figures on percentage of deposits derived from foreign (Euro and other) sources alone suffice to indicate that some banks do not have the same ranking in the money market as do various traditional money center banks, such as Citibank and JPMorgan Chase—to name just two. One of the more interesting aspects of Table 6.1 is how it differs from Table 6.2, which

TABLE 6.1

Top 12 U.S. banks as of June 30, 2006

Institution Name	State	Total Assets (\$ billions)
Bank of America, National Association	NC	1,160.3
JPMorgan Chase Bank, National Association	OH	1,144.7
Citibank, National Association	NY	777.3
Wachovia Bank, National Association	NC	504.3
Wells Fargo Bank, National Association	SD	415.9
Washington Mutual Bank	NV	350.9
U.S. Bank, National Association	OH	212.6
SunTrust Bank	GA	181.4
HSBC Bank USA, National Association	DE	168.9
Citibank (West), FSB	CA	137.3
World Savings Bank, FSB	CA	128.4
Bank of New York	NY	93.9

Source: Federal Deposit Insurance Corporation

shows the top 12 U.S. banks as of January 1989. The differences reflect the many changes that have occurred in the banking industry over the years, particularly because of deregulation and global competition.

One of the most important developments that has occurred in the banking industry in recent years has been its consolidation. This is seen most clearly in the number of banks that exist today compared to the number in the early 1990s. Figure 6.1 highlights this trend. There were 7,569 banks at the end of 2005 compared to over 12,000 15 years earlier. The chart also highlights the steady increase that has occurred in the share of assets held by both the top 10 and top 100 banks. This further highlights the large amount of consolidation that has taken place.

TABLE 6.2

Top 12 U.S. banks as of January 1, 1989

Institution Name	State	Total Assets (\$ billions)
Citicorp	NY	207.7
Chase Manhattan	NY	97.5
Bank of America	CA	94.7
JPMorgan	NY	83.9
Security Pacific	CA	77.8
Chemical Banking	NY	67.3
Manufacturers Hanover	NY	66.7
First Interstate Bancorp	CA	58.2
Bankers Trust New York	NY	57.9
Bank of New York	NY	47.4
Wells Fargo	CA	46.6
First Chicago	IL	44.4

Source: Federal Deposit Insurance Corporation

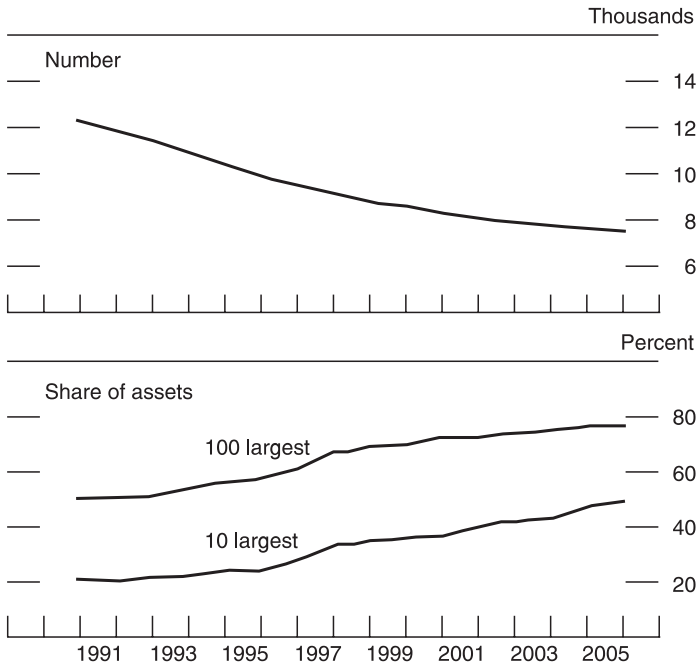
Greater concentration of industry assets should not be mistaken for greater risk, as demonstrated by Figure 6.2, which shows the share of industry assets that are held by well-capitalized banks. At nearly 100%, banks these days appear healthier than they were in years past. There are other metrics, of course, which can be used to gauge the health and risks inherent in the banking sector. We discuss some of these later in the chapter.

The activities of a money center bank encompass several separate but related businesses. All money center banks engage in traditional banking operations: accepting deposits, lending, managing an investment portfolio, and running a trust department. In addition, they act as dealers in money market securities, in governments, in municipal securities, and in various synthetic and derivative products. Also, several have extensive operations for clearing money market trades for nonbank dealers. A final important activity for money center banks is foreign operations of two sorts: participating in the broad international capital market known as the *Euromarket* and operating within the confines of foreign capital markets (accepting deposits and making loans denominated in local currencies).

Of the various banking activities described, two—trust operations and clearing operations per se as opposed to granting dealer loans—could

FIGURE 6.1

Number of banks and share of assets at the largest banks, 1990–2005



Source: Federal Reserve

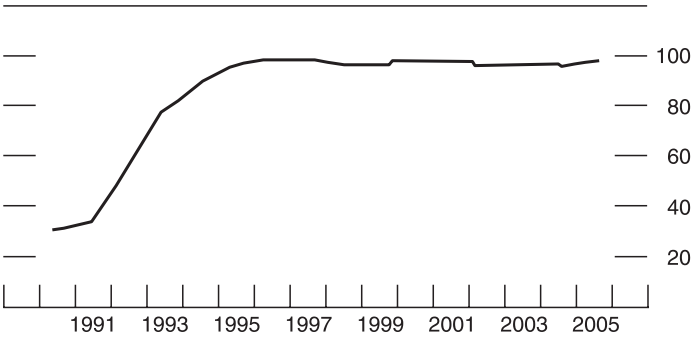
be described as largely off-balance sheet profit centers. Both require capital in the form of space and equipment but do not require substantial funding from the bank.¹ The trust department invests other people's money, and the clearing operation provides a service. In contrast, the banks' three other primary domestic activities—lending, running a portfolio, and dealing in securities—must be funded, since each involves acquiring substantial assets.

In the United States, unlike in most foreign countries, bank branching was traditionally severely restricted, particularly before the passage of

¹ Clearing does impose large *intraday* funding needs on a clearing bank and thus contributes to daylight overdraft by such a bank at the Fed. When a bank incurs daylight overdraft, it goes *OD (overdrawn)* in its reserve account at the Fed (Chapter 12).

FIGURE 6.2

Share of industry assets at well-capitalized banks
(in percentage points)



Source: Federal Reserve

the Riegle-Neal Interstate Banking and Branching Efficiency Act in 1994. Because bank charters were initially granted only by the states, banks were not permitted to branch interstate; and in most states—California being a notable exception—even intrastate branching was severely restricted or prohibited. That is why the 14,000-odd banks that existed 15 years ago and even today’s figure of around 7,500 banks are numbers unparalleled in any other developed country. Gradually, all this changed and then accelerated following the 1994 legislation, such that today, bank branching, even interstate, is more common. In fact, although the number of banks has declined, the number of bank offices increased by over 10% between 1995 and 2005, to 89,814, with the number of offices per bank increasing from 6.3 to 9.5.²

In some geographic regions, states, seeing interstate banking on the horizon, formed exclusive regional pacts that permitted banks within the region to merge. The idea was to give regional banks time to build size and profitability before New York and other money center banks were permitted to bid for them. The result was the creation of a number of large and highly successful superregional banks.

Comparing the largest and the smallest banks in the United States, one might conclude that the most they have in common is the name *bank*. Actually, that’s extreme: all institutions called *banks* accept deposits,

² Doug Campbell, “Branch Bonanza,” Federal Reserve Bank of Richmond, *Region Focus*, Winter 2005.

make loans, and have at least a few government and/or agency securities on their balance sheets. There, however, the similarity between the largest banks and their smallest sisters ends.

To finance its operations, a money market bank draws funds from various sources. It starts with a fairly stable base of money—bank capital and the demand, savings, and time deposits it receives in the normal course of its commercial banking activities. The total of these is typically below the value of the assets the bank wants to finance, so there is a funding gap that the bank fills by buying money in the federal funds market, the repo market, the deposit note markets, and the Euromarket.³ Indeed, at the end of September 2006, of the roughly \$9.3 trillion in assets held by U.S. commercial banks, roughly \$1.8 trillion of these assets were financed through borrowings.⁴

As the above suggests, managing a money market bank involves a host of decisions concerning what assets to hold and what liabilities to incur. Before we say more about these, two comments are in order. First, one cannot separate a bank's domestic operations from its foreign operations, but we are going to try—treating domestic operations in this chapter and European operations in the next; the European market is a fascinating and complex story that deserves a full chapter. Second, big banks are a disparate collection of animals. Some of their differences reflect differences in circumstances: some with their hundreds of domestic branches are deposit-rich; others with few domestic branches are, like most money market banks, deposit-poor, all on a relative scale, of course. Other differences reflect variations in historical patterns of development, areas of specialization, their international perspective, and management philosophy. More about that below.

Profit and Risk

However heterogeneous the nation's largest banks may be, there still are strong similarities in the way that top management in these banks view and attack the problem of managing a large bank. First, their objective is, like that of management in any industrial, manufacturing, or other business concern, to earn *profits*. Second, banks, like nonbank firms, operate

³ See Chapter 3 for an introduction to these markets and the instruments traded in them.

⁴ These data were obtained from the Federal Reserve's H.8 weekly statistical release on assets and liabilities of commercial banks in the United States.

under uncertainty and thus face *risk*. Risk in banking arises from several sources. On every loan a bank makes there is *credit risk*: the risk that the borrower won't pay back the money lent. Second, because of the mismatch, contrived or natural, that typically exists between the interest-rate maturities of the assets and liabilities on a bank's balance sheet (in banker's jargon, the *mismatch* or *gap* in the bank's book), a bank is exposed to *interest-rate risk*. This second risk arises not only in connection with a bank's loans, but as a result of its portfolio and dealer operations, particularly for the largest banks, where securities holdings are now a bigger part of bank assets, representing 23.4% of assets at the end of 2005 for the top 10 banks compared to 19.8% in 1996. A third risk is *liquidity risk*, which is really the risk of illiquidity. Every money market bank continually buys large quantities of short-dated (short-term) funds to finance its operations. Liquidity risk is the risk that the bank might at some point be unable to buy the monies it needs at a reasonable price or, worse still, at any price.

Because any attempt by a banker to make profits involves risks, her objective inevitably becomes to *maximize profits subject to the constraint that perceived risks be held to some acceptable level*. Also since bank analysts, investors, and bank depositors all focus strongly on current income, bankers have a strong predilection for an earnings pattern that displays steady growth over time.

MANAGING A MONEY MARKET BANK

In recent years, a number of dramatic changes have occurred in the environment in which money center banks operate. Taken together, these changes have altered the mix of profit sources for money center banks, with decreases in certain of their traditional activities replaced by increases in other activities. Thus, banks have had to evolve and change their strategies for maintaining profitability, apparently doing so very successfully, judging by trends in profitability in recent years.

To highlight the changes that are occurring in big banks, we begin by describing how a money center bank was managed in the past. We then turn to the present.

The Way It Used to Be, and How It's Changed

Economists' favorite term, *decision variable*, denotes something having a value that is the result of a conscious decision. *Exogenous variables*, in

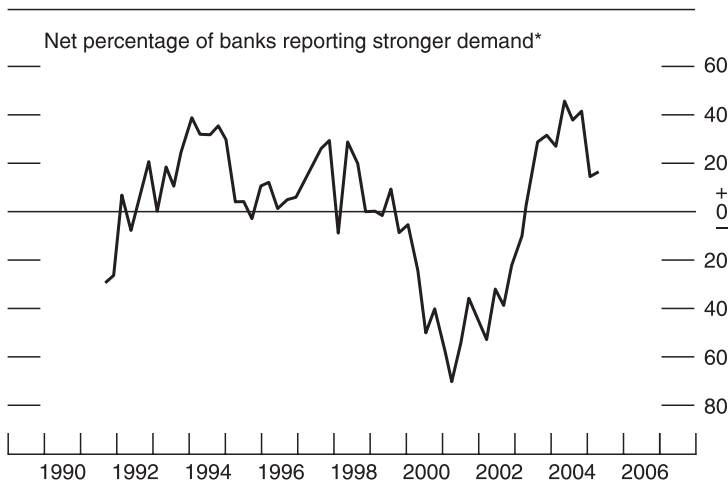
contrast, are things having a value more or less thrust on the decision maker by the outside world. On a bank's balance sheet, in the short run at least, both sorts of variables are found. Let's start with the exogenous ones.

Every bank establishes standards to limit credit risk. Once it has done this, a bank will normally do everything possible to meet the legitimate loan demands of any customer who meets these standards. Loans are a source of bank profits, and loan customers normally provide a bank with deposits and other business as well. The quantity of loans demanded from a bank depends largely on the state of the economy and on what funds are available to would-be borrowers from other sources. These factors are beyond the control of the banks, so their loan volume is very much an exogenous variable. Bankers can wish they had more loans, but they can't decide to have them if loan demand is weak. Figure 6.3 illustrates the variability in loan demand that bankers have had to contend with in recent years as well as the changes that have occurred in the banking industry's willingness to extend loans.

In the short run, bank capital is also an exogenous variable, having a value that depends on past decisions. A third variable that is largely

FIGURE 6.3

Changes in demand and supply conditions at selected banks for commercial and industrial loans to large and middle-market firms, 1990–2006 (in percentage points)



*Series begins with the November 1991 survey.

Source: Federal Reserve

exogenous in the short run is the sum of demand deposits, savings deposits, and the time deposits received by a bank. Over time a bank will have built up a customer base that supplies it with a quite stable amount of such deposits as well as fee income, increasingly a source of funds for the banking industry. To significantly enlarge that base would take time and effort. A final important exogenous variable is the reserves against deposits that a bank must keep with the Fed.

From a bank's viewpoint, the decision variables it faces in the short run are the size and composition of its investment portfolio, the dealer position it assumes, and the quantities and maturities of the monies it buys in the fed funds and Eurodollar market, the repo market, and various other markets.

In assigning values to these decision variables, the bank is determining in part what asset portfolio it will hold and how it will fund that portfolio. In other words, it is choosing a balance sheet that meets its goal of maximizing return subject to the constraint that perceived risks be held at an acceptable level.⁵

Several facts of life are of crucial importance for the bank in making these balance sheet choices. One is that buying money is going to be a continuing way of life for a money market bank. Capital plus what we called *exogenous deposits* minus whatever reserves have to be held against such deposits are available to a bank for funding loans. However, since money market banks as a group tend to be relatively deposit poor, it's uncommon for these sources of funds to suffice to cover loans, not to speak of funding a securities portfolio and a dealer position.

Thus, a second crucial fact of life for a money market bank is that it must have the preservation of liquidity as a concern of overriding importance. By liquidity we mean the bank's ability to acquire money whenever it is needed in huge and highly variable sums. Since the principal, in fact almost the only source of liquidity a money market bank has, is its ability to buy money, maintaining access to its markets for bought money—fed funds, Eurodollars, repos, and others—becomes the *sine qua non* for the continued operation of such a bank.

A third fact of life facing a bank is the yield curve. Money market and bond yields are normally higher the longer the maturity of an instrument except when a downturn in interest rates is anticipated. This means,

⁵ Marcia Stigum and Rene Branch, *Managing Bank Assets and Liabilities: Strategies for Risk Control and Profit* (Homewood, Ill.: Dow Jones-Irwin, 1982).

as any banker knows, that one path to profits and prosperity is often to acquire assets with maturities that are longer than those of the liabilities used to fund them—*borrowing short and lending long*. A domestic banker would refer to this as running a *gap* or *gapping*. A European banker would call this running a *mismatched* or *short book*. Gapping or mismatching contrasts with running a *matched book*—that is, funding every asset acquired with a liability of identical interest-rate maturity.

Asset and Funding Choices

The facts of life we have just discussed influence profoundly the asset and funding choices bankers make. Let's look first at loans. When loan demand increases, the shape of the yield curve often tempts bankers to fund those extra loans by buying the shortest-dated money they can. Yet bankers rarely do so except for short periods when they are waiting to see whether the increase in loans will be sustained. One reason is that regulators would frown on such a policy. A second and more important consideration is that funding loans with overnight money on a large scale would conflict with the bank's need for continued liquidity. As banker after banker will note: "If we tried to finance a big increase in loans by suddenly buying a lot more overnight money, that would be immediately visible in the market and later visible in our published statements. People, particularly suppliers of funds, would begin to question why we were getting out of line with 'safe practices' [roughly the average of what other banks are doing], and our ability to continue to buy money might be impaired. That is something we could not allow to happen." The upshot of all this concern is that bankers have the option of funding loan increases largely through the purchase of funds having a maturity of up to 30 days or longer. In 2006, the inverted yield curve made it difficult for banks to profit on new loans via funding in the money markets. Hence, many banks were selling lower-yielding assets in their securities holdings in order to fund higher-yielding loans. In cases where this option was less viable, banks aggressively marketed CDs to obtain funding.

A bank's securities portfolio is a different breed of animal from its loan portfolio with respect to both acquisition and funding. On the funding side, the principal difference is that the Fed permits a bank to finance its holdings of governments and agencies in the repo market (by selling them under an agreement to repurchase on an overnight or longer basis) without incurring a reserve requirement.

Money market banks acquire portfolios of government securities for various reasons. First, there is a cosmetic motive. Traditionally, *all* banks held governments for liquidity; as a result, even today a money market bank that had no governments on its balance sheet might raise eyebrows. Second, and more important, money market banks hold governments, sometimes large amounts, for profit. Especially when economic growth slackens and interest rates are falling, money market banks increase their holdings of governments because at such times governments can normally be financed at an attractive positive spread in the repo market.⁶ The trick, of course, in a hold-bonds-for-profit strategy is not to be holding too many when interest rates start their next cyclical upswing and bond prices begin to fall as financing costs rise. To the above, it should be added that in some years, characterized by an inverted yield curve and by volatile interest rates, the case for a bank to hold any governments was weak at best.

Bankers feel comfortable financing a large proportion of their government portfolios with overnight funds because government securities, unlike loans, are highly liquid and banks can and sometimes do sell large amounts of such securities over short periods. Consequently, long-term funding of the portfolio, besides being expensive, is neither needed nor appropriate.

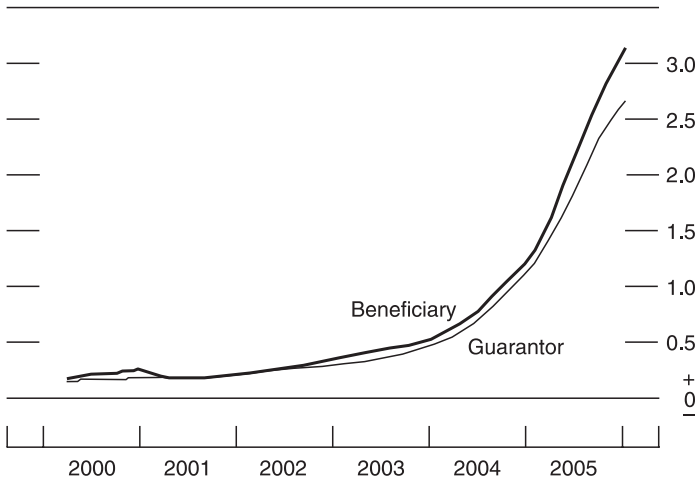
To the extent possible, banks use the repo market rather than the fed funds and Eurodollar markets for funding their portfolios. Generally, overnight repo money is cheaper than overnight fed funds and Eurodollars (Chapter 13). Also the repo market, unlike the fed funds and Eurodollar markets, is an anonymous market in the sense that no other banks or brokers are tracking how much a bank borrows there. Thus, a bank can make substantial use of the repo market without impairing its liquidity.

Many money market banks act as dealers in government and other exempt securities. Since a dealer by definition acts as a principal in all transactions, buying and selling for its own account, a bank running a dealer operation inevitably assumes both long and short securities positions. This can distort the amount of risk that a casual observer might believe exists on the banking industry's balance sheet. To illustrate, consider the notional and fair value holdings of derivatives by all U.S. banks at the end of 2005. As Figure 6.4 shows, the notional principal value of derivatives held by all banks was \$102 trillion at the end of 2005, a figure

⁶ The *financing spread* is said to be *positive* if the cost of the funds borrowed is less than the yield on the securities financed. This is also known as *positive carry*.

FIGURE 6.4

Notional amounts of credit derivatives for which banks were beneficiaries or guarantors, 2000–2005 (in trillions of dollars)



Note: The data are as of quarter-end.

Source: Federal Reserve

that to some might seem a bit alarming. The reality, however, is that the risks associated with those derivatives holdings are much smaller than they seem. A better gauge is the fair market value of the derivatives, which at the end of 2005 stood at \$1.262 trillion, minus the amount of derivatives with a negative value, \$1.246 trillion. The difference of \$16 billion is a far smaller number than the notional value, reflecting the netting of holdings linked to the role that banks play as dealers. The data also overstate the extent of exposure at all banks, with 98% of the notional value of the amount of derivatives at the end of 2005 held by the 10 largest banks.⁷

Bank dealerships also acquire securities holdings, at times quite large ones, because they are positioning for profit. Increasingly, this means that banks are buying securities other than U.S. Treasuries, particularly government agencies and mortgage-backed securities, for example, which these days represent a much larger portion of banks' securities holdings than Treasuries do, especially for the largest banks. In the middle

⁷ Elizabeth C. Klee and Gretchen C. Weinbach, "Profits and Balance Sheet Developments at U.S. Commercial Banks in 2005," Federal Reserve Board, *Federal Reserve Bulletin*, June 2006.

of 2006, for example, commercial banks held just \$101.1 billion of Treasuries compared to \$1.169 trillion for securities backed by federal agencies and government-sponsored enterprises (GSEs). Banks finance their dealer positions in the same way they finance their investment portfolios.

Mismatching the Book

Earlier, we say that banks must be concerned with interest-rate risk and liquidity risk. Matching asset and liability maturities to the extent possible would appear to be a way for a bank to limit both risks. However, it's not easy to find a banker who professes to follow this strategy. One reason is that it would be difficult if not impossible for a bank to do so. Few if any assets on a bank's balance sheet have a definite maturity. A 10-year note or a 2-year note in the bank's portfolio might be sold tomorrow. Term loans and mortgage loans are often prepaid, and 3-month loans are frequently rolled (renewed). On the liability side of a bank's balance sheet, many items have specific maturities—repos, time deposits, fed funds, and Eurodollars purchased—but a question arises as to how to view demand deposits. Technically, demand deposits can be withdrawn at any time, and funds deposited in these accounts are often swept into money market accounts, but in practice demand deposits in the aggregate provide a bank with a quite stable source of funds. Besides being impractical, any attempt to match asset and liability maturities would be expensive to a bank because lending long and borrowing short is a potential source of bank profits.

The vast majority of bankers profess to follow the *pool* concept of funding; instead of matching specific assets against specific liabilities, they think of all the funds raised by the bank as a pool that in the aggregate finances the bank's assets. In the next breath, the same bankers will say that they repo their governments and meet increases in loans with the sale of longer-term liabilities. What is really going on?

Typically, a bank sets up a high-level committee that, besides making general decisions about what sorts of assets the bank should acquire, attempts to measure in some way, however arbitrary, the average maturity of the bank's assets and liabilities and thereby the implicit mismatch in the bank's overall position. The committee's objective is to profit when possible from a maturity mismatch while also monitoring the size of that mismatch so that it never grows so large as to endanger the bank's liquidity or expose the bank to undue rate risk. Under this approach,

big increases in loans inevitably end up calling for the bank to buy more term funds, while an increase in securities holdings can comfortably be accommodated by increased purchases of overnight money.

To this rough generalization, several comments should be added. First, banks don't just react to current conditions. Management is constantly attempting to predict the future and to position itself so as to maximize future earnings. In particular, banks are constantly forecasting loan demand, deposits, and interest rates. On the basis of such forecasts, a bank might, for example, decide to issue more term liabilities than it normally does because it expects interest rates and loan demand to rise sharply. Or it might decide to rely more heavily on purchases of fed funds and Eurodollars than it normally does because it expects loan demand and interest rates to fall. Interest-rate forecasts also strongly influence the bank's decision about the size and maturity distribution of its portfolio and dealer positions.

The brief picture we have presented of managing a big bank leaves much unsaid. The rest of the chapter attempts to update this picture and to fill in some of the missing subtleties. Also, banks are active in every market we describe, so they are with us throughout the rest of the book.

TODAY'S CHANGED ENVIRONMENT

Our sketch of the issues involved in managing a money market bank and of how such a bank meets the resulting challenges remains correct in some, but not all, respects. In recent years, a number of major changes have occurred in the environment in which banks operate—changes that have forced big banks to make *strategic changes* in how they do run or would like to run, subject to regulatory changes, their businesses.

The Lending Business

In the past, a money market bank could earn a natural *spread* between the rates at which it funded itself and the rates at which it could lend to good credits. Thus, banks looked to lending as a key source of profits, one that could be augmented by adroit funding and mismatching of maturities when appropriate.

Net Interest Margin

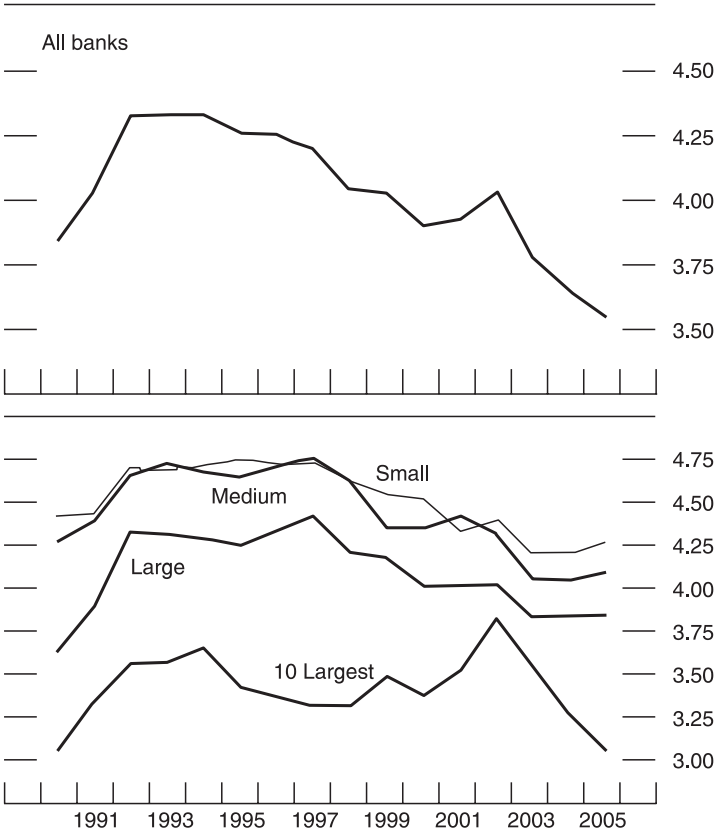
In recent years, a significant increase in competition in the banking industry has put downward pressure on *net interest margin*, which is the difference

between the amount of interest banks receive on interest-bearing assets and the interest that they pay on interest-bearing assets. This downward pressure has played a major role in the strategies that banks have chosen to boost their profitability. In particular, the decrease in net interest margin has put pressure on banks to boost the income associated with noninterest income as a proportion of total revenue.

Figures 6.5 and 6.6 show both the decline in net interest margin and the increase in noninterest income that has occurred in recent years.

FIGURE 6.5

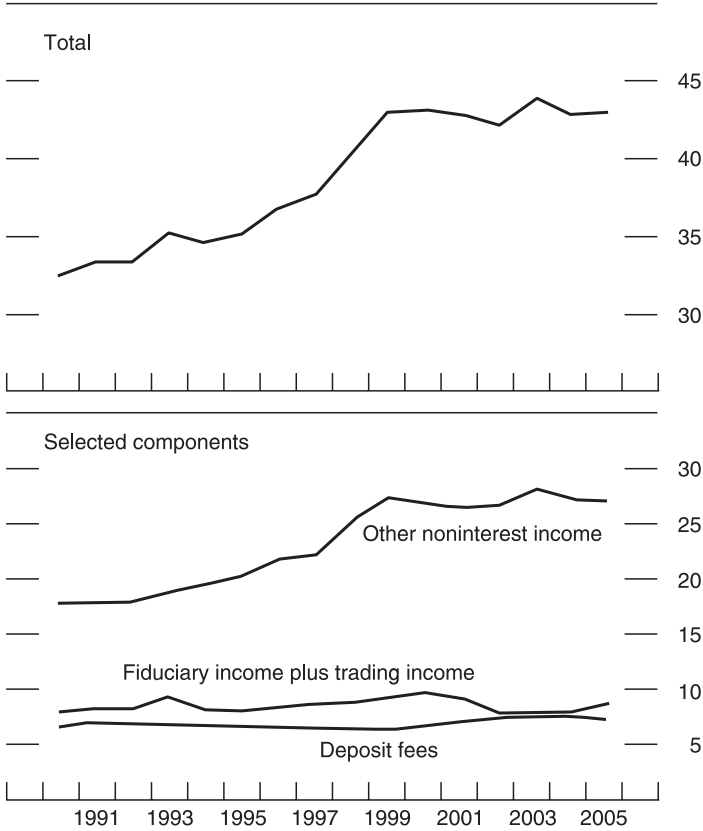
Net interest margin by size of bank, 1990–2005
(in percentage points)



Note: The data are annual. Net interest margin is net interest income divided by average interest-earning assets. For a definition of bank size, refer to the general note on the first page of Klee and Weinbach, 2005.
Source: Federal Reserve

FIGURE 6.6

Noninterest income and selected components as a proportion of revenue, 1990–2005 (in percentage points)



Note: The data are annual. Revenue is calculated as the sum of noninterest income and net interest income.
Source: Federal Reserve

In 2005, respondents to the Federal Reserve’s quarterly Senior Loan Officer Opinion Surveys on Bank Lending Practices (BLPs) indicated that the persistent narrowing of net interest margin on commercial and industrial loans reflected increased competition from other banks and/or non-bank lenders. This is easy to envision when considering the amount of competition that has cropped up in recent years. Today, a borrower can choose from a much greater number of mortgage lenders, for example. Moreover, with rates more transparent than ever, borrowers can readily

compare rates among lenders, putting additional downward pressure on net interest margin. Home equity loan offerings have also proliferated, and an average of 4 billion credit card solicitations are mailed each year, increasing the consumers' options for obtaining financing for consumption.⁸

Although the decline in the banking industry's net interest margin has been widespread, variations have occurred within the industry that shed light on some of the factors that tend to influence net interest margins. For example, in 2005, although net interest margins fell for the banking sector as a whole, the entire decline was attributable to a 21 basis point decline at the 10 largest banks. One of the reasons is that larger banks tend to utilize managed liabilities more than smaller banks do, because, as we mentioned earlier, larger banks are relatively deposit-poor. Since managed liabilities tend to carry higher interest rates than other interest-bearing funding sources, when larger banks increase their share of managed liabilities, their net interest margins are pressured. At the opposite end of the spectrum, smaller banks saw their net interest margins increase in 2005, just as they did in 2004 when the Federal Reserve began a series of interest-rate increases that lasted into 2006. The main reason is that rates on core deposits at smaller banks tend to reset more slowly than they do at the larger banks, where competitive pressures are more intense. Similarly, on the revenue side of the equation, in a rising interest-rate environment, rates on commercial and industrial loans tend to rise more at smaller banks than they do at larger banks, reflecting greater competitive pressures on the larger banks.

Gone are the days when bankers operated on the so-called *3-6-3 rule* when bankers accepted deposits at 3%, lent the money at 6%, and were on the golf course at three o'clock! Bankers' hours in today's competitive environment are around the clock.

Capital Adequacy Requirements, Basel II

In December 1987, the Basel Supervisors' Committee of the Group of Ten (countries), which had been meeting in Basel, Switzerland, under the auspices of the Bank for International Settlements (BIS), the central bankers' central bank, issued a memorandum that came to be called the *Basel Capital Accord* or *Agreement*. This memorandum, now called *Basel I*, was adopted in 1988, and it contained agreements on *risk-based capital*

⁸ John R. Walter, "The 3-6-3 Rule: An Urban Myth?" Federal Reserve Bank of Richmond, *Economic Quarterly*, Winter 2006.

requirements to be imposed on banks in the Group of Ten and to be used as the standard for countries worldwide. The objective of this move was twofold: (1) to strengthen the capital positions of major international banks and (2) to do so as uniformly as possible so that banks of no major country would in the future be advantaged by being able to operate with relatively low capital ratios. Since then, Basel I has become outmoded, and a new capital adequacy framework for *Basel II*, also known as *Basel IA*, has been under negotiation since 1999 for adoption at the end of 2007, although many banks would continue to operate safely under Basel I for a time. Table 6.3 highlights some of the capital requirements from Basel I.

Basel II, which will be based on recommendations by bank supervisors and central bankers from the 13 countries that are part of the Banking Committee on Banking Supervision, will contain significant changes that go well beyond the 25 amendments implemented since the adoption of Basel I. According to the Bank for International Settlements (BIS), the fundamental objective of the committee's work to revise Basel I is, "To develop a framework that would further strengthen the soundness and stability of the international banking system while maintaining sufficient

TABLE 6.3

A sampling of Basel I capital requirements

Assets	Capital Requirement (percentage of assets in category)
Cash; U.S. Treasury and agency securities	0.0
Interbank claims; state and local government general obligation bonds	1.6
Residential first-lien 1–4 family mortgages; certain privately issued mortgage-backed securities; state and local government revenue bonds	4.0
Business and consumer loans; industrial development revenue bonds	8.0
Certain asset securitizations with long-term, below-investment-grade credit ratings	16.0

Note: The Basel Capital Accord has been revised more than 25 times since its inception, and the asset categories are very detailed. For more information, see *Banking Regulation: Its Purposes, Implementation, and Effects*, by Kenneth Spong, Federal Reserve Bank of Kansas City, 2000.

Source: Federal Reserve Bank of Dallas

consistency that capital adequacy regulation will not be a source of competitive inequality among internationally active banks.”⁹ A key objective of the committee has been to adopt significantly more risk-sensitive capital requirements that are also conceptually sound and that respect the particular features of the present supervisory and accounting systems in individual member countries. One of the biggest shortfalls of Basel I, according to Fed Chairman Ben Bernanke, is that its “relatively crude method of assigning risk weights to assets, as well as an emphasis on balance sheet risks as opposed to other risks facing financial firms, limits the overall responsiveness of capital requirements to risk under Basel I, which renders that system increasingly inadequate for supervising the largest and most complex banking organizations.”¹⁰ The framework for a new accord contains three main elements, known as the *three pillars of Basel II*: risk-focused regulatory capital requirements, supervisory review, and market discipline.

While the committee’s guidelines under Basel I addressed the issue of creating a level playing field among global banks with respect to capital adequacy, U.S. money center banks for many years had to operate with one major disadvantage relative to foreign global banks: whereas foreign global banks operate from a nationwide domestic base, U.S. money center banks, thanks to restrictions on branching, could not. Most of the global banks in the world that are doing well were able to start with a successful, nationwide enterprise in their home country, one that was difficult, for example, to match for New York money center banks which were constrained to limit the bulk of their domestic banking activities to New York State. The relaxation of restrictions on interstate banking in the Riegle-Neal Act of 1994 has helped to turn the tide, although it is a process that takes time.

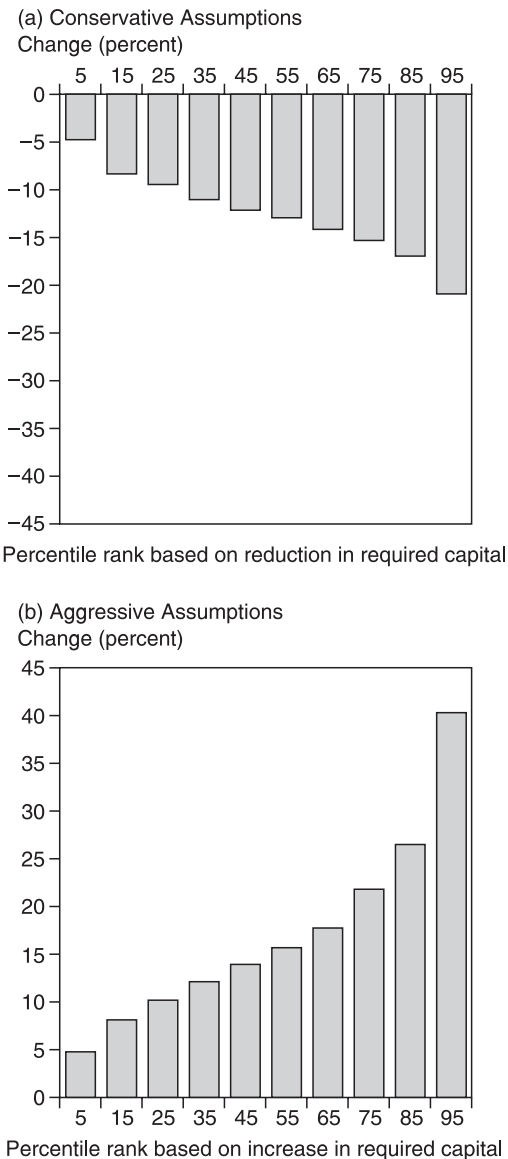
The impact of Basel II on U.S. banks will vary depending upon their size and on the extent to which they tend to act aggressively or conservatively in the conduct of their businesses. The new risk-based capital requirements will reduce the capital requirements for conservative banks; banks that are more aggressive with their operations will experience an increase. As an illustration of the impact on local banks, Figure 6.7 provides insight. The chart, which was compiled by the Federal Reserve

⁹ Basel Committee on Banking Supervision, “International Convergence of Capital Measurement and Capital Standards,” Bank for International Settlements, June 2004.

¹⁰ Ben Bernanke, “Basel II: Its Promise and Its Challenges,” Federal Reserve Board, remarks from a speech delivered before the Federal Reserve Bank of Chicago’s 42nd Annual Conference on Bank Structure and Competition, May 18, 2006.

FIGURE 6.7

Eleventh district capital needs under Basel IA; distribution of change in required minimum capital



Source: Federal Reserve Bank of Dallas, Consolidated Reports of Condition and Income, December 31, 2005

Bank of Dallas for area banks, shows the changes to capital requirements that are expected to occur under Basel II.¹¹

Given all the country-to-country differences that exist in bank regulation, accounting requirements, and standards as to what counts as capital and how it counts, it takes central banks some time to translate the committee's guidelines into national guidelines and still more time for bankers to figure out what it all would mean both for them and for their international competitors. It is notable, for example, that the Federal Reserve's Notice of Proposed Rulemaking (NPR) released in March 2006 contains 450 pages of details and complexities that will have to be absorbed by the banking industry for years to come. Moreover, there will no doubt be additional supervisory guidance to absorb.

Deregulation and Globalization of Debt Markets

A major development in the United States and worldwide has been the breakdown of barriers of all kinds both around and within national capital markets; these include the lifting of restrictions on the issuance of securities, on who could borrow and on who could lend; on foreign exchange controls; and on the elimination of withholding taxes on interest paid to foreigners. In addition, the international payments system has advanced to the point where sending both securities and monies across borders has been simplified and standardized enough to entice investors to freely consider foreign investments as an alternative. These developments have created for borrowers an explosion of opportunities in the open market.

The changes that have occurred have been stark. For example, in some countries there were great barriers around their domestic capital markets. There were ceilings on the amount that could be lent, and there were withholding taxes and other barriers to people coming from the outside in. These days, a substantial portion of these barriers is gone. Once the global markets were allowed to compete with these restricted markets, the accessibility of the restricted markets began to lure investors.

The breaking down of the barriers in and around domestic capital markets has benefited not just native borrowers. It has also stimulated a rapid *globalization of financial markets*; specifically, borrowers who need ultimately to borrow their own local currency now consider borrowing opportunities—including the issuance of securities—not only in their

¹¹ Kory Killgo and Kenneth J. Robinson, "Banking on Basel: An Alternative for Capital Requirements," Federal Reserve Bank of Dallas, *Southwest Economy*, July/August 2006.

own capital market, but in capital markets worldwide. Similarly domestic investors who need ultimately to invest their own local currency now consider investment opportunities not only in their own capital market, but in capital markets worldwide.

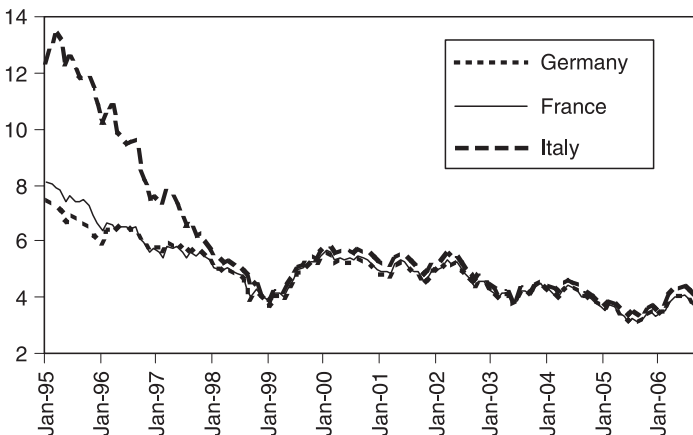
The advent of the euro in 1999 has had a major impact on the globalization of debt markets. Its main impact has been in the creation of a second large, global, fixed-income market. The European bond market is now large enough for international borrowers to consider borrowing in a currency other than the U.S. dollar, and investors can be more liberal about investing in Europe without having to pick and choose a particular currency denomination. Investors also no longer have to put much emphasis on how a particular European country's bond might perform compared to other European bonds, given the sharp convergence in yields that has occurred there (Figure 6.8).

The Global Networking of Trading and Payments Systems

Globalization of markets requires instantaneous global communications, something today's traders sometimes take for granted. However, such

FIGURE 6.8

European government securities rates converged following the introduction of the euro in 1999 (10-year securities in percent are shown)



Source: Bloomberg

communications did not exist in decades past. Thus, the globalization of markets that is occurring today could not have occurred then even if regulations worldwide had been congenial to the free exercise of capitalist finance and to free cross-border flows of capital. Today's trading and information systems continue to make the world a flatter place, as the saying goes.

A story told by a senior bank officer makes, tellingly, the point of how global communications have changed in a few short decades: "When I joined foreign exchange in 1957, there was in June–July a sterling crisis that had been going on since 1947. Everyone was focused on sterling. Unfortunately, on one trying day, sunspots disturbed the airwaves and thus cut out one of our lines of communication to London. Then, a Russian trawler dropped its anchor on *the* transatlantic cable putting it out of commission. Consequently, we spent a whole day trying to figure out whether we had or had not borrowed [a mere] 100,000 pounds in London."

Notable developments which have not only facilitated the movement of capital across borders but which have encouraged it through a reduction in the potential for systemic risks associated with key elements of the global payments infrastructure include the 1989 G-30 standards on clearance and settlements systems, the Lamfalussy Report, the launch of a Continuous Linked Settlement (CLS) bank, and the paper on "Sound Practices to Strengthen the Resilience of the U.S. Financial System."

In the future, policy makers will have to continue to adapt to the likelihood of continued increases in cross-border financial transactions. One of the major challenges will be to oversee the infrastructure of the over-the-counter derivatives market, including both the documentation process and the settlement of transactions, where unconfirmed transactions have been a nagging problem for the industry.

Development of Sophisticated New Products

Globalization has been thrust forward not just by the breaking down of various barriers to international capital flows, but by the introduction of new financial tools. The most important of these have been swaps—cross-currency and interest-rate swaps. There has also been a sharp increase in the amount of credit default swaps outstanding (Chapter 19). Swaps have played a key role in the explosion of opportunities open to borrowers and lenders.

"All of this," noted one U.S. banker, "has created a menu for corporations that is much more efficient than just borrowing *your* currency from

your bank. Thanks in part to the elimination of withholding taxes, U.S. and other corporations now have access to yen, the euro, and other national capital markets; they can, for example, issue Euro commercial paper hedged. The development of the swap market [interest rate and currency] was the piece that made the opening of these national barriers interesting—that made borrowing euros interesting when you wanted dollars in the end. All this, together with currency hedging mechanisms, has created a global market.”

Securitization

In discussing the trend toward deregularization, we mention the trend toward securitization of debt which can't be overstressed. Thanks to the SEC's Rule 415, which permits shelf registration of securities offerings, and to similar deregulation elsewhere, the whole procedure of issuing notes and bonds has become generally much less onerous than it used to be and has resulted in a mushrooming of private debt securities everywhere. Worldwide, existing commercial paper markets are growing and new ones are being created; in the United States, the original home of this market, commercial paper outstanding now exceeds T-bills outstanding (Chapter 22). The markets have also seen sharp growth in the market for medium-term notes, domestic and European (Chapter 24). Yet another example of securitization is the packaging of receivables, such as car loans, into negotiable securities known as *asset-backed securities* (ABS), dubbed CARS in the case of auto loans. Home equity loans, mortgage loans, student loans, and credit card debts have also been packaged as asset-backed securities. The asset-backed securities market has seen sharp growth in recent years, with record issuance in each of the five years ended in 2005, according to the Bond Market Association. The biggest part of the \$2 trillion ABS market in the middle of 2006 was the market for home equity loans, followed by credit card receivables.

All of the above developments affect the market for bank loans. Today, good credits need less and less to rely on a bank intermediary when they borrow; the world offers them a wide menu of direct borrowing opportunities, some of which are quite attractive viewed from the perspective of the terms and all-in cost that the borrower achieves.

BANKING AS FOUR BUSINESSES

Deregulation and globalization have created opportunities for banks to pursue many new businesses, and they are doing so. Today's banks have

FIGURE 6.9

The four businesses of banking

Portfolio Asset/position funding: “Own account” “What’s best for the bank”	Corporate Finance Problem solving: “What’s best for the client”
Distribution	Trading

their hands in a variety of types of businesses both domestically and internationally. In many cases these new endeavors are augmentations of the four distinct businesses at the core of the money market banks (Figure 6.9).

Business 1 might be called the *portfolio or Treasury business*. This is the business of asset (or position) accumulation and funding; otherwise own account; otherwise—and this is key—*what is best for the bank*. In business 1, the bank acquires assets, securities, or loans that it can fund at a spread over its cost of money; it also seeks to enhance that spread by mismatching its book when rates and its rate view indicate that that’s likely to be profitable.

Business 2 is *corporate finance*—the investment banking business that has emerged out of old-style lending. A client may come to a bank and say, “I want financing. How do I do it?” Business 2 calls for the banker to explore opportunities: a loan, a public offering with or without various bells and whistles. She might, for example, advise her client, “Do a public offering this and this way and you’ll save 10 bp.” Here the banker’s focus is strictly on *what’s best for the client*, and her reward is a *fee*, maybe 2 of the 10 bp she saves the client.

Business 3 is *trading*. Banks have always been in trading as part of us-first banking, and they need to be in trading for market making and liquidity. For example, a part of the strategy of money center banks today is to aggressively make loans with the notion that they will sell off, to investors. The sale of loan participations (Chapter 23) at a slight markup is one example. That’s a line of business with profit potential that does not

affect a bank's balance sheet. An even more important part of the banking business is the sale and packaging of mortgages. Also, with banks now having expanded powers to underwrite and trade corporate securities, they will need to expand their trading activities if they are to meet long-run success in business 2, corporate finance.

Business 4 is *distribution*. Banks have long had sales forces to sell their own paper and the *exempt* securities—governments, agencies, general obligation munis, BAs, Eurodollar CDs, and other money market paper—that banks are permitted to trade. Today, those sales forces are augmented by new people selling the bank's loans in the secondary loan market and also commercial paper, a security that banks didn't always have the right to distribute. Also, banks have become very active in the over-the-counter derivatives markets, particularly the interest-rate swaps market. As banks and their affiliates are empowered to deal in yet other securities, banks' distribution will have to expand to cover these new securities. As noted below, all bank trading of securities is, for regulatory reasons, being shifted into an affiliate, which is a subsidiary of the bank's holding company.

THE BUSINESS OF TRADING

In discussing a money center bank's four businesses, we begin with trading because the expansion of bank and of bank affiliate powers to underwrite and trade a broad range of securities is crucial to the current strategy of many money center banks: to expand their investment banking activities. Only if banks are permitted to trade in volume a wider range of securities than past and even present regulations permit will they be able to compete successfully with nonbank dealers in providing corporate finance services to their clients. This is why the banks have for years pressured regulators for expanded powers to deal in nonbanking activities.

Most money market banks have long had extensive dealer operations. The biggest part of their dealing activity has been in Treasuries, agencies, and mortgage-related securities, but banks are also big dealers in over-the-counter derivatives and underwriters of state and local general obligations (GOs) (banks were not permitted to sell state and local revenue bonds until the repeal of Glass-Steagall). As evidence of the banking industry's large presence in the securities markets, the list of primary government securities dealers is supportive. The list, which as of September 15, 2006, contained 22 names, with 14 of those names having banking operations.

Besides being a profit center, a bank's dealer department also provides it with useful, up-to-the-minute information on conditions in the money and bond markets. There's much to be said about how a dealer operation, bank or nonbank, runs. We turn to that in Chapter 10.

Gramm-Leach-Bliley Act and the Bank Holding Company Act

Here, we focus on the expansion of the range of securities in which banks may deal. This story is one that will continue to unfold as banks consider new securities in which to deal. The impetus for this comes from the Gramm-Leach-Bliley Act, which was signed by President Bill Clinton on November 12, 1999. The act repealed Glass-Steagall and amended the Bank Holding Company Act of 1956, opening the door for banks to consider dealing in new products. Specifically, Gramm-Leach-Bliley amended the Bank Holding Company Act by providing for the creation of financial holding companies, which are bank holding companies that may engage in any activity or hold the shares of any company that engages in any activity that the Federal Reserve Board has determined is either financial in nature, incidental to financial activities, or complementary to existing activity and does not pose a substantial risk to the safety or soundness of depository institutions or the financial system generally.

Some History

Just what banks were and were not permitted to do was a tangled question before Gramm-Leach-Bliley. There were two principal federal acts guiding bank practices, the Glass-Steagall Act and the Bank Holding Company Act of 1956 as amended.

There were four provisions of Glass-Steagall. Two provisions stated what a bank could do; two provisions, what a bank *affiliate* could do. Basically, a bank affiliate could engage in a wider range of activities than a bank. Each U.S. money center bank is owned by a holding company, which also owns other companies; these other companies are affiliates of the bank.

Section 16 of Glass-Steagall stated that a bank could act as an *agent*—buy or sell securities with no recourse for the account of a customer. However, a bank could not *underwrite* securities (act as a *principal* in distribution and dealing activities) except for certain *exempt* securities.

Exempt securities that Glass-Steagall specifically permitted a bank to *underwrite*—to position and to publicly offer—included U.S. Treasury securities, federally guaranteed securities, and municipal general obligations (not revenue bonds).

The Glass-Steagall exemption did not include CDs and BAs. However, by interpretations that weren't challenged, banks were permitted to underwrite and deal in CDs and BAs. The grounds for these interpretations were that: (1) such paper is not securities for the purposes of Glass-Steagall and (2) underwriting such paper was not the sort of bank activity that Glass-Steagall intended to prohibit. Note there were no large-denomination, negotiable CDs until 1961, decades after Glass-Steagall was written in 1933.

The agency provision of Glass-Steagall enabled banks to do *private placements* in which they sold to a limited group of institutional investors in large minimum amounts corporate stocks, bonds, and other securities. These things were done within the bank. In fact, in the United States, banks have played a significant role in it.¹²

The Banks' Fight for Expanded Powers

In their long fight for expanded securities powers, the banks' principal adversary in the courts and before Congress was the *Securities Industry Association (SIA)*, which is the nonbank dealers' trade group. Nonbank dealers naturally think that it would be dandy to have banks forever forbidden to tread on their turf.

The skirmishing between banks and nonbank dealers dates back to at least 1978. In that year, Bankers Trust began to act as an advisor and *agent* to issuers of commercial paper, an activity that Bankers viewed as permissible under the Glass-Steagall Act. In 1979, the SIA asked the Fed to declare Bankers Trust's commercial paper activities unlawful; the Fed declined to do so. The SIA then turned to the courts, which in two rulings at the district court level determined (1) that commercial paper was a security and (2) that Bankers Trust's agency placements of commercial paper

¹² It's estimated that in 1988 slightly over \$250 billion was raised through the sale of publicly offered debt. In the same year, \$150 billion was raised through the sale of privately placed debt, almost triple the amount five years earlier. The private placing of debt to finance leveraged buyouts (LBOs) has fueled the rise in private placements. So too has the specter of event risk (raised in particular by LBOs); thanks to event risk, prospective buyers of publicly offered bonds are today demanding restrictive covenants that no entity with good credit wants to be the first to grant.

violated federal law. Bankers Trust, for its part, kept selling commercial paper while it appealed adverse court rulings. By the time its role as agent-advisor in the sale of commercial paper was upheld by a federal appeals court in Washington, Bankers Trust had 76 corporate clients with \$6.8 billion of commercial paper outstanding; this made it the sixth-largest placement agent for such paper. Also, by that time, Morgan had entered the commercial paper business as agent-advisor, and it had 37 corporate clients.

Today, bank holding companies rank among the top firms in the commercial paper market. That these bank holding companies are so prominent is unsurprising, since only money center banks have securities subsidiaries (subs) with the sales staff, back office support, distribution capability, and trading apparatus in place to make an effective bid to enter the commercial paper market.

The tenacity with which banks have fought to gain a toehold in the commercial paper market is easily understood. “Things were getting to the point,” observed one banker, “where a corporate treasurer needed a bank only for things such as a line of credit, money transfers, custodial services, and letters of credit, but not for financing. The focus of the banks in fighting for the right to do commercial paper was to get back commercial customers who had been walking out on the banks. Acting as an issuer’s agent was an easy way for a bank to be able to talk finance with a corporate on a daily basis.”

For banks, it was only half a loaf to advise a client, “Issue this and that security, but sorry we can’t execute.” That’s why bankers were adamant that the substance of Glass-Steagall had to go.

Banks Fight for the Right to Underwrite Ineligible Securities

Winning the battle described above gave the banks only the right to act as *agent* in the sale of commercial paper, *not* the right to *underwrite* it.

The banks’ next step was to petition the Fed for the power to *underwrite* nonexempt securities *in a bank affiliate*. This fight had to do with what a bank affiliate could or could not do. Consequently, it was not only a Glass-Steagall issue, but it was also a matter for the Fed to decide under the Bank Holding Company Act.¹³ Under the Bank Holding Company Act,

¹³ Section 20 of Glass-Steagall prohibited a member bank from being affiliated with an entity engaged principally in underwriting securities.

the issue was: What activities are so closely related to banking so as to be appropriate for a bank affiliate? In April 1987, the Fed ruled that bank affiliates could *underwrite* certain types of securities, as opposed to just placing them as agent, provided that such activities amounted to no more than 5% of the gross revenues of the affiliate and that the affiliate was principally engaged in areas of trading and underwriting (or other activities) permitted by Glass-Steagall to a bank. The *four* types of unexempt securities that bank affiliates were permitted to underwrite were *commercial paper*, *mortgage-backed securities*, *municipal revenue bonds*, and *securities backed by various debts*. Promptly, each major bank holding company formed a securities sub and put into that sub all trading done by its bank in exempt securities, such as Treasuries and agencies, and in nonexempt securities.

The Fed's April 1987 ruling enraged nonbank securities dealers, who successfully lobbied Congress to impose in August 1987 a moratorium on the expansion of bank affiliate powers that expired the following March. In effect, Congress said: "It is our province, not the Fed's, to expand bank affiliates' powers, and we are going to do something here."

In early 1988, the Senate passed a bill that would have permitted bank affiliates to underwrite anything but corporate equities and without the 5% restriction. The House, in contrast, got into a wrangle: St. Germain of the House Banking Committee declared that such a bill fell on his turf; Dingle of the House Energy and Commerce Committee said, "No, this is securities legislation, and as such, falls on my turf." The upshot was that the House did nothing; and Proxmire of the Senate said to the Fed, "It's up to you to act." The cross fire on the issues involved was intense; one securities lobbyist likened legislating on the subject to a war-torn country with factions within factions fighting each other.

In any case, in October 1988, Citibank, Chase, Morgan, and Bankers Trust all petitioned the Fed for the right to underwrite all debt and equity securities (excluding mutual funds) in their respective affiliates. In response, the Fed ruled in January 1989 that the bank affiliates that had applied to it, including Security Pacific's, could underwrite corporate debt under the same restrictions that it had earlier applied in its April 1987 ruling. The Fed also indicated that it would consider increasing the ceiling on a bank affiliate's trading in nonexempt securities from 5% to 10%. Finally, the Fed said that it would defer for a year its decision on whether bank affiliates could underwrite corporate equities.

The SIA threatened to challenge the Fed's new rulings in the courts. Note that the issue here was not really a Glass-Steagall issue because the courts had already ruled that a bank affiliate could engage in underwriting activities that a bank could not so long as those activities weren't a substantial portion of the affiliate's total business. Thus, the thrust of the SIA case concerned the Bank Holding Company Act.

In entering the business of underwriting ineligible securities, the banks enjoyed no advantage over nonbank dealers with respect to funding, since the Fed had created a firewall to prevent it. Specifically, under the Fed's ruling, a bank was prohibited from extending *any* credit to its securities affiliate, except intraday credit extended in connection with the clearing of U.S. government securities; also, under the Fed's 1987 ruling, a bank holding company was permitted to lend to its securities subsidiary, but such loans had to be overcollateralized or deducted from the capital of the holding company. Where banks had an advantage over most securities dealers was in international distribution. Generally, the biggest of the banks had operations in more foreign financial centers and had been there for longer than the biggest of the U.S. nonbank dealers.

Profitability No Barrier to Reform

Much of the time when U.S. banks were fighting for the right to underwrite an expanded menu of securities, their profits were rising sharply. In 1999, when Glass-Steagall was repealed, insured commercial banks were earning record profits, with profits up by 16% to about \$72 billion compared to the previous year. These profits posed no barrier to Glass-Steagall from the nonbank dealer community, further underscoring the large momentum that had built up toward reform of banking regulations.

Gramm-Leach-Bliley; Summary of Provisions

The Gramm-Leach-Bliley Act contains numerous provisions that allow banks, securities firms, and insurance companies to affiliate with each other. Below is the Senate Banking Committee's summary of the many provisions contained in the act taken from the banking committee's Web site.

- Repeals the restrictions on banks affiliating with securities firms contained in sections 20 and 32 of the Glass-Steagall Act.
- Creates a new "financial holding company" under section 4 of the Bank Holding Company Act. Such holding company can engage in a statutorily provided list of financial activities, including insurance and securities underwriting and agency activities, merchant banking and insurance

company portfolio investment activities. Activities that are “complementary” to financial activities also are authorized. The nonfinancial activities of firms predominantly engaged in financial activities (at least 85% financial) are grandfathered for at least 10 years, with a possibility for a 5 year extension.

- The Federal Reserve may not permit a company to form a financial holding company if any of its insured depository institution subsidiaries are not well capitalized and well managed, or did not receive at least a satisfactory rating in their most recent Community Reinvestment Act (CRA) exam.
- If any insured depository institution or insured depository institution affiliate of a financial holding company received less than a satisfactory rating in its most recent CRA exam, the appropriate federal banking agency may not approve any additional new activities or acquisitions under the authorities granted under the act.
- Provides for state regulation of insurance, subject to a standard that no state may discriminate against persons affiliated with a bank.
- Provides that bank holding companies organized as mutual holding companies will be regulated on terms comparable to other bank holding companies.
- Lifts some restrictions governing nonbank banks.
- Provides for a study of the use of subordinated debt to protect the financial system and deposit funds from “too big to fail” institutions and a study on the effect of financial modernization on the accessibility of small business and farm loans.
- Streamlines bank holding company supervision by clarifying the regulatory roles of the Federal Reserve as the umbrella holding company supervisor, and the state and other federal financial regulators which “functionally” regulate various affiliates.
- Provides for federal bank regulators to prescribe prudential safeguards for bank organizations engaging in new financial activities.
- Prohibits FDIC assistance to affiliates and subsidiaries of banks and thrifts.
- Allows a national bank to engage in new financial activities in a financial subsidiary, except for insurance underwriting, merchant banking, insurance company portfolio investments, real estate development, and real estate investment, so long as the aggregate assets of all financial subsidiaries do not exceed 45% of the parent bank’s assets or \$50 billion, whichever is less. To take advantage of the new activities through a financial subsidiary, the national bank must be well capitalized and well managed. In addition, the top 100 banks are required to have an issue of outstanding subordinated debt. Merchant banking activities

may be approved as a permissible activity beginning five years after the date of enactment of the act.

- Ensures that appropriate antitrust review is conducted for new financial combinations allowed under the act.
- Provides for national treatment of foreign banks wanting to engage in the new financial activities authorized under the act.
- Allows national banks to underwrite municipal revenue bonds.

CORPORATE FINANCE

The emphasis that a number of money center banks today want to place on corporate finance is a natural development of their history as lenders. Thus, we begin this section by sketching the evolution of bank lending in recent decades.

Evolution of Bank Lending

A number of money market banks, like other banks, extend credit to consumers and make home mortgage and other real estate loans. However, a large proportion—the number varies considerably from bank to bank—of their domestic lending is to commercial and industrial (C&I) customers. On the aggregate, the total amount of C&I loans outstanding was \$1.18 trillion at the end of September 2006, representing roughly 13% of commercial bank assets.

For decades, the environment in which banks have operated has been subject to constant change. One result is that banks have had to continually alter their lending practices, searching for areas in which they have a profitable role to play in supplying credit.

Before World War II, much bank commercial lending was short term. Firms in wholesale trade and commodities needed financing, often on a seasonal basis, to fill their warehouses; and their bank supplied it. The normal arrangement was that the bank would look over the customer's books once a year and decide how large a line of credit it would be willing to grant this firm. The firm could then borrow during the year any sum up to that amount, provided no material change occurred in its credit after the line was granted. The customer paid for its line with compensating balances, borrowed as necessary on the basis of 90-day notes, and was expected to give the bank a *cleanup* (pay off all its borrowings) at some time during the year.

When World War II came along, the situation changed. Defense contractors had to invest huge sums in new plant and equipment. They could have financed these investments by selling bonds, the traditional approach, but that seemed inappropriate. They didn't expect the war to continue forever. Also, they believed they could pay for their new plant and equipment rapidly because they had a customer, Uncle Sam, who was sure to pay and because they could depreciate their plant and equipment at an accelerated rate. So they asked the banks for term loans. The banks provided such credits with amortization built in, and while criticized at the time for doing so, banks ended up successfully entering the area of medium-term commercial lending.

After the war, borrowers, who had become accustomed to 5-year credits, asked for more flexibility. On a term loan, they didn't always want to have to take down all the money right away; they also wanted the right to prepay some of or their entire loan if their cash flow improved seasonally or permanently. So bankers said, "Alright, that's a revolving credit. You can have it, but at some point, you'll have to give us a cleanup." The final stop in this evolution came when the customer said to her bank: "I'm not sure I will ever need to borrow from you, but I want to know that I can if I need to, not just now but for some number of years." In response, bankers developed a *revolving line of credit*; the customer paid balances *plus a commitment fee*; in exchange for which the bank promised to honor the line for the life of the agreement. A customer could turn such a *revolver* into a term loan simply by borrowing.

Today, the environment for bank lending remains in flux, as evidenced by the volatility in lending activity seen in the early 2000s (Figure 6.3).

Rate Risk

From the start of World War II until 1951, the Fed pegged yields on government bonds, and interest rates moved little. Then in 1951, after considerable infighting, the Treasury agreed that the Fed should be permitted to pursue an independent monetary policy. This Treasury-Fed accord spelled the end of rate pegging, and interest rates began a secular climb punctuated with periodic ups and downs. The pace of this climb was, however, slow. As a result, bankers rarely changed the prime rate that they charged their best customers, and they felt safe lending at a fixed rate not only on 90-day notes, but also on term loans; the rate risk in both sorts of lending seemed small. Then things changed. Inflation became a problem,

and to fight it, the Fed pushed up interest rates sharply and rapidly on a number of occasions starting in the mid-1960s.

The banks felt the impact of the initial credit crunch largely in terms of opportunity cost. At that point, they weren't buying huge amounts of money, so tight money didn't dramatically raise their funding costs. It did mean, however, that funds locked up in old low-interest term loans could not be lent out at the higher current rates. Later, as banks began to rely more and more on bought money, tight money significantly increased their funding costs; and the rate risk implied in *fixed-rate* lending became pronounced.

To minimize this risk, banks changed their lending practices. They began changing the prime rate more frequently, and they started altering the rate on existing as well as on new short-term loans whenever they changed prime. They also made it a rule to put term loans on a *floating-rate* basis. The rule, of course, wasn't always followed. As one executive noted at the time: "We bankers are not as smart as we could be. When rates get near the peak and we ought to be making fixed-rate term loans, we shy away from doing so. Then when loan demand and lending rates decline and we are out scrambling for loans, we are tempted to make fixed-rate term loans just when we shouldn't." Actually, even fixed-rate term loans made when interest rates are high are less advantageous to banks than one might suppose. Once rates decline, the borrower is likely to say to her banker, "You're my banker, and you know that the best thing for me would be to refinance this loan in the bond market or on other terms," and typically, the banker would let the borrower do so without penalty, regardless of whether the loan agreement called for one. On variable-rate term loans, the rate charged generally went to an increasing spread above the prime rate during the later years of the loan. This maturity spread was supposed to compensate the banker for her long-term commitment, but she rarely earned it because of prepayment or renegotiation.

To some extent, bankers used to think of their special niche in commercial and industrial lending as that of providers of flexible medium-term financing. Also, the money they provided was "warm" money in the sense that the lending arrangement was not only open to negotiation initially, but subject to renegotiation should the borrower's position change. By moving to floating-rate loans, banks shifted much of the rate risk involved in lending from their shoulders to those of the borrower, which presumably made bank loans less attractive to borrowers.

The prime rate, although viewed by some as a collusive price-fixing device, was once responsive to open market conditions. Today, the rate is tied directly to the fed funds rate, which is of course controlled by the Federal Reserve. Ever since 1992, the prime has run 3 percentage points above the Fed's target rate. Before the prime was pegged to the funds rate, a fall in open market rates attracted bank customers to the open market and to other nonbank financing sources, and thus put pressure on banks to lower the prime, whereas a rise in open market rates increased the cost of bank funding and the demand for bank loans and so did the opposite.

When the Fed tightened credit, the resulting increases in the prime rate, particularly if they were frequent and sharp, once made bankers unpopular with politicians and the public. So, gradually, bankers moved away from what appeared to be an arbitrarily set prime to one that was based on money market rates and fluctuated up and down with them. Citibank began the trend in 1971 by linking its prime to the 90-day commercial paper rate. Specifically, Citibank said that henceforth it would set its prime at the 90-day paper rate plus a spread, which fluctuated from as little as $\frac{1}{8}$ to as much as $1\frac{1}{2}$ percentage points.

While pricing loans at a flexible prime was supposed to eliminate a bank's rate risk on loans by tying its lending rate to its cost of funds, banks still encountered difficulties during periods of tight money. In the United States, as in many other countries, the prime rate was so politicized that at times it became impossible for the banks to raise it further. During several such periods, banks found themselves forced to make new loans at rates *below* their marginal cost of funds, that is, at rates below the cost of the extra money they had to buy to fund these loans.

The Passing of Prime

In the 1980s, the pace of change in bank lending practices had, if anything, accelerated. The world still kept its eye glued on prime, but as one banker succinctly put it: "Prime is dead."

Bank lending terms used to be "10 plus 10." To get a line of credit, the customer had to put up 10% compensating balances; if she took down funds under the line—in addition to paying prime—she had to put up another 10% compensating balances on the amount of the loan. In those days, *prime was close to the banks' cost of funds, and what the banks really made money on was the free balances that granting lines and loans generated.* Then competition began to whittle away at the balances.

Instead of 10 plus 10, the terms became a straight 10% for the existence of the facility, and competition gradually cut that to 5%. By 1980, line and loan agreements for major loans were being written with no balance provisions.

As compensating balances vanished, banks found themselves earning on lines and loans just the rate charged on the funds taken down. Consequently, *banks had to administratively widen the spread between prime and their cost of funds so they could make some money*. Treasurers at major corporations, who push ever faster pens, reacted to a prime rate that floated at an increasing spread to banks' cost of funds by saying, "We won't borrow any more at prime except when it is to *our* advantage to do so. The spread between prime and other money market rates is so high that prime has become unrealistic. Worse still, we are being forced to accept the interest-rate risk our bank used to take. And to top things off, banks always raise prime in step with money market rates, but when they misjudge the direction of rates and mistakenly fund loans with high-cost, long-term funds, banks are slow to lower prime as money market rates drop."

Just as important in the demise of prime was the sharp increase that was occurring in the amount of funding that borrowers were obtaining through the capital markets, which were in the midst of a sharp secular upward trend. With interest rates falling and the globalization of the debt markets growing apace, borrowers had the option of going to the bond market to raise money. Similarly, the secular bull market in equities gave companies the option of going to the stock market for funds.

Either/or Facilities

In bygone days, it was the practice that the terms on which major corporations could borrow from U.S. banks were as follows: they could get Eurodollar loans on Eurodollar terms—LIBOR plus a small, fixed spread—to fund foreign operations, *but* they were supposed to borrow at prime to fund domestic operations. The Eurodollar market was seen as near perfect and consequently *very* efficient. Corporate treasurers, eyeing the terms they were getting from domestic banks on Eurodollar loans booked outside the United States and on prime-rate loans booked at the bank's head office, were quick to conclude that a Eurodollar loan was often the better deal. So on large loans—particularly large syndicated loans—they literally forced their banks to give them line agreements that provided an *either/or facility*: when the time came to take down funds, the

corporate treasurer could choose—regardless of where the funds were to be spent—whether she wanted a Eurodollar loan priced off LIBOR or a loan priced at prime. From 1980 on, every large-term loan negotiated by a major corporation with a money market bank contained an either/or option.

The either/or option gave a borrower two advantages: (1) she could, at times, use it to lower her funding cost by getting money in the market where the bank's spread was lower; and (2) she could use it to place her own bet on rates. If rates were on a plateau, the borrower might find that a floating-note Eurodollar loan at 3-month LIBOR plus a spread was cheaper than a prime-rate loan and opt for the former. Alternatively, the borrower could anticipate a rise in rates and decide that her cheapest option was to fix her borrowing rate by taking down 6-month money in the Eurodollar market even though the rate she paid, 6-month LIBOR plus a spread, exceeded prime. Finally, the borrower might ask for a loan at prime because she anticipated that money market rates would fall, and she wanted to position herself so that her borrowing cost would fall with those rates. Today, with prime 3 percentage points above the funds rate, prime is much higher than many other funding options such as commercial paper and even some junk bonds. Moreover, borrowers can go abroad to obtain funding if they feel that dollar-based borrowing rates are too high. Prime is no bargain in today's rate environment.

Advances

After the advent of either/or facilities, the next change in bank lending practices was the introduction by major banks in the domestic market of short-term, fixed-rate loans priced off a bank's marginal cost of funds. On such loans, dubbed *advances*, a bank would price overnight funds at a spread over the fed funds rate, 30-day money against 30-day CDs or 30-day term funds, and a 6-month advance against 6-month money. Advances in the domestic market are priced in much the same way as Eurodollar loans are priced in the Eurodollar market, against money market rates.

It's a misconception that banks began making advances in the domestic market solely to compete with the commercial paper market. Another motive was to keep business that they would have lost had they insisted that borrowers pay prime at a time when borrowers felt that prime was unrealistically high. Big banks felt compelled to devise some pricing

mechanism that would give the borrower a rate she'd view as realistic; that is what pushed banks into making loans at *subprime rates*.¹⁴

Eventually, the enthusiasm of banks for extending advances at subprime rates faded for a time because they found that doing so was unprofitable. "The good borrowers," noted one banker, "are doing commercial paper, so we have here the small guy who does not want to take any interest-rate risk. He comes in and takes money every day, every week, or every month. What he needs—the amounts are small—changes every day."

Bank Competition with Commercial Paper

Back in the 1930s, banks basically financed the working capital of corporate America. Today, the commercial paper market does so. Once, bankers viewed the growing commercial paper market as threatening and unwanted competition, but eventually they realized that if the billions of dollars of business done in the commercial paper market were added to the billions of C&I loans on their books, the impact on their capital ratios would be disastrous. Also, bankers began to perceive the commercial paper market as providing them with a tidy and steady flow of fee income for providing lines to paper issuers, lines that—because they were largely unused—had little or no impact on bank liquidity or interest-rate risk. In effect, the commercial paper market provided banks with fees for doing next to nothing.

To create the appearance of liquidity necessary to sell commercial paper, almost all issuers back a very high percentage of their outstanding paper with *committed* facilities (Chapter 22). Specifically, the banks promise in exchange for balances and/or fees to provide commercial paper issuers with money should they encounter difficulties in rolling their paper.¹⁵ This commitment gives the issuers the liquidity required to make their paper salable.

Initially, banks granting such lines would say to the issuer, "You can have the lines, but only if you commit to pay 1% over prime if you take down funds under it." The issuer would often respond, "We'll give you 2% over prime." That was rational since, as banks soon learned, most paper issuers made it a policy never to use their bank lines as a last-resort source of funds if they could avoid doing so. When money was tight, commercial

¹⁴ Traditionally, prime-rate loans were considered, implicitly, to be 90-day working capital loans. As corporate treasurers' borrowing needs began to be identified with greater precision (because of major advances in cash-flow projection techniques) and other borrowing options grew, the underlying rationale for traditional prime-rate lending eroded.

¹⁵ To *roll* paper means to repay maturing paper by selling new paper.

paper issuers would pay up rather than come into their banks for funds. So bankers said, “OK, you can have the lines, but we want a fee,” which they got and still get, albeit much less than in years past.

Over the years, several things have occurred to change the relationships of banks to commercial paper issuers. First, after initially only selling commercial paper as agents, today more banks are underwriting paper. Second, commercial paper rates have moved very close to the fed funds rate, making it more likely that borrowers will tap the commercial paper market instead of obtaining funding through commercial and industrial loans, which carry higher rates. Third, some banks have also begun to make short-term loans to issuers of commercial paper under bid options in their line agreements with issuers; such an option permits an issuer to bid a rate for short-term funds that its line bank may or may not accept. Banks making such loans sometimes sell participations in them to managers of liquidity portfolios, who correctly view them as a close substitute for commercial paper (Chapter 23).

Bankers' Acceptances

The closest banks come to competing directly with the commercial paper market is by issuing loans in the form of bankers' acceptances (BAs). Unfortunately for banks, bankers' acceptances are a tiny fraction of the credit market, with only around \$4 billion outstanding in 2006. On certain types of transactions—financing exports, financing imports, and the storage and shipment of goods at home and abroad—the bank can take the borrower's note, accept it (guarantee payment at maturity), and then sell it in the open market without incurring a reserve requirement. The interest rate charged the borrower is determined by rates prevailing in the bankers' acceptance market. These are normally less than commercial paper rates, but the banks' standard acceptance fee adds additional cost, so the *all-in cost* to the BA borrower may exceed the rate on commercial paper. When loan demand is high, bankers can sell the BAs they originate and take their spread, but when loan demand is slack, they are more likely to hold them as earning assets. For domestic money market banks, originating BAs is a small and not very profitable business (Chapter 21).

Bankers: A Changing Mission

Old-style banking combined the bank's Treasury function—asset acquisition and funding on terms *best for the bank*—with its corporate

finance function. Today the emphasis is increasingly on *what is best for the client*. In the old days, a client would come into a bank and say, “I want to finance this plant,” and the banker (lending officer) would say, “Have I got a loan for you.” What the banker was really doing was a combination of the above two functions—she was trying to position herself with her client so that her client thought the banker was doing him a favor, but what the banker was really trying to do was to acquire an asset suited to the bank. Thus, it was vague and unclear in the client’s mind and indeed in the banker’s mind exactly what solution loan negotiation was producing—best for the bank *or* best for the client. That was OK as long as there were not too many instruments out there. The client could clearly see what his options were: this, this, or this. He knew that when he came to his banker, he was getting a person who could deal in one or very few instruments and that he was going to get pitched to do what the bank did: loans. What has changed is that there are now hundreds of vehicles that a banker might use to solve her client’s problem.

The explosion in the opportunities open to a borrower or for that matter to an asset manager reflects not just securitization encouraged by deregulation, but the breaking down of barriers that previously surrounded domestic capital markets plus the development of new financial tools—swaps, option products, credit derivatives, and currency hedging mechanisms—that together have created a global market in financial assets and liabilities.

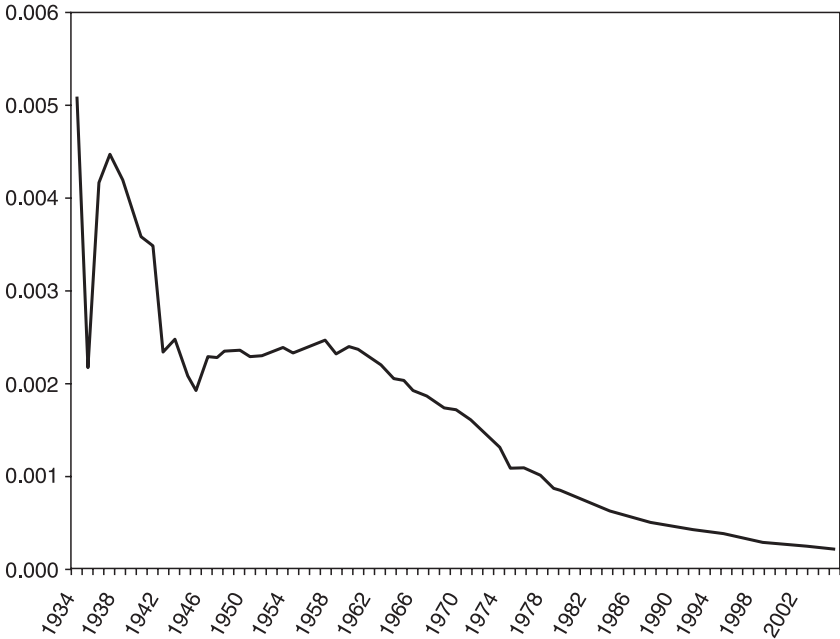
Today’s banker no longer wants to be confined to a single-product capability or to a narrow product line. She has to have access to what can be done in Swiss francs, in yen, in euros, in sterling, and in dollars; to what can be done in the short, medium, and long term; to what can be done swapped; to what can be done hedged and unhedged. Today’s banker, if she’s to do her job, must present all this to the client with a bank loan being but one option. That is fundamentally the difference in the role of a banker today from what it was in years past. The two businesses—(1) corporate finance, *what is best for the client*, and (2) asset acquisition, a Treasury function centered on *what is best for the bank*—have become two separate jobs.

The Evolution of Bankers

Not surprisingly, the trend in banking toward the provision of corporate finance has changed the banker’s role. A bank now needs fewer bankers, and those it needs have to be more sophisticated and more senior than in

FIGURE 6.10

Bank employees to assets—all U.S. banks



Note: Number of employees divided by assets (thousands).

Source: Federal Reserve Bank of Richmond, based on FDIC data

the past. In fact, for the banking industry as a whole, the number of bank employees relative to the amount of bank assets has fallen sharply over the years (Figure 6.10), making it more important than ever that bank employees wear many hats. The new style banker is hence a *generalist* who has sufficient access to a lot of *specialists* (traders) so that, when a client comes in and says, “How do I finance it?,” she can, getting her bank’s traders’ best advice, package and sell to the client a deal that meets the client’s objectives. That today is a banker’s job.

Delivery Choices

A banker, by definition a generalist, can never be an expert in all products—from credit default swaps to caps and floors. Therefore, a bank faces a choice as to how it will distribute expert advice, and banks are demonstrating that there’s no one right solution to this. It depends on who a bank is

and what it wants to do. A bank has to balance the amount of distribution it does through bankers, generalists who are supposed to know a lot about a lot of things, and the amount of distribution that it does through specialists such as its caps-and-floors trader. At one extreme is a bank like a Merrill that does almost everything through specialists, and banks, which for years had been at the other extreme, doing everything mostly through bankers. Today, banks are doing much more through specialists, and their operations mirror those of the largest brokerage houses.

For a bank, it is crucial to give a client what he wants, so if a client wants to talk to an interest-rate swaps trader and if that is the best way to get the client's business, a bank tries to get as close to that solution as possible. However, other bank clients are likely to be intimidated by a bank's interest-rate swaps trader: clients don't know enough to deal with her; they're afraid that the trader will put her interests first; and they're more comfortable with a generalist. Whatever a bank does, it has to strike the balance that works for it organizationally.

Distributions via generalists and via specialists both have their own risks. If a bank tries to distribute purely via specialists, it's likely to find that its specialists talk their own game all the time; they are trying to make money; and although they won't admit to it, they talk their own book; they are very short term in outlook; and they don't really give a damn about how happy the client is at the end of the day. Also, overuse of specialists tends to create little fiefdoms where people do not cross sell. It can be done, but it is very tough to get someone who is focused narrowly on a product or a business to worry about what the client is going to do two weeks from now with another area of the bank. Thus, a risk in giving clients access to specialists is that a bank builds barriers to cross selling.

On the other hand, it is equally bad for a bank to have a sophisticated client—a World Bank or a central bank—talk to a generalist when the client wants serious and up-to-the-moment-please advice about opportunities in sterling and euros, in swaps, or in credit derivatives. A client can get general hand-holding wisdom from a generalist, but for a client who knows the game and what play he wants to make, a generalist is the wrong person to talk to. At some senior level at a World Bank, there's a person who wants to talk to a senior generalist at a bank about strategy, but at another level there are, at a World Bank, traders who want to talk to a bank's traders. Meshing who talks to whom and when calls for finesse. Specialists have to be channeled to specialists. More broadly, a bank has to organize its interface with a client to suit the client, not the bank.

A senior banker noting the different perceptions about dealing with generalists versus dealing with specialists once said, “I would talk to the Treasurer for global finance [of a firm with a sophisticated Treasury operation]. We would talk about trends, about how markets are evolving, about the soundness of various markets, about financial strategy, and at the level up from there. It would be very hard for us to talk down from there. Their traders are too specialized, too narrow, too good—and they’re better informed than we are. For me to talk to the commercial paper trader of a big direct issuer, someone who talks to the top 10 dealers every morning about their thinking on the market, would be nonsense; and we recognize that.”

Another division of labor a bank faces is determining how to treat a client that does business worldwide. A reasonable solution is for a bank to have one officer looking after that client worldwide wherever the client is, while the bank delivers product to the client from different places. According to this approach, a New York bank would look after U.S. companies from New York, but if these companies wanted something from London, the bank’s London office, using its specialists, would deliver that product there. Conversely, the London office would look after U.K. companies, but if a U.K. company needed a product from New York, the bank’s head office would deliver that product in New York. Although advances in communications have broken this divide somewhat, there remain preferences among both distributors and their clientele to deal with people in their own backyard.

Corporate Finance: Assets and Liabilities

Once a bank focuses not just on lending and generating assets for the bank but on the broader area of corporate finance, it becomes increasingly natural for the bank, in seeking what’s best for the client, to work not just on the client’s liabilities, but on his assets—his cash, his investment portfolio. “We have as a strategy,” noted one senior banker, “taking every item on a client’s balance sheet—both sides—and asking, ‘Where can we bring value?’ One place is in real estate. A significant portion of corporate America’s consolidated assets are real estate, so we are spending a lot of energy at the moment figuring out how we can solve real estate problems—how we take these great, immobile, illiquid investments clients have and realize shareholder value, create opportunities for the client.” Corporate financial assets are also getting increasing attention from bankers; the same logic that has made liability swaps a huge business, can be and is being applied to asset swaps (Chapter 19).

“It’s a whole different approach,” continued the same banker. “Instead of being in business to lend money, I am in business to create value some way or another for the client—to do the best job I can for him. If I save the client a dollar—be it in his cash, his pension fund, his real estate, his inventories, his short-term debt, his medium-term debt, his equity, whatever—I will take 10 cents. That is our strategy. That is a different business; we are not just peddling loans. We need wholly different people who need to be trained differently, who have to interface with experts differently, who have to do everything differently.”

Mergers and Acquisitions

One area of investment banking that has consistently offered Wall Street investment bankers hefty fees and profits is *mergers and acquisitions* (M&A). This has not escaped the notice of money center banks whose strategy it is to shift from corporate lending to corporate finance. A number of banking titans—Wachovia, Morgan, and Citi, for example—have made successful forays into corporate America so that it will do its M&A deals with them. Citi was quick to engage in an acquisition of its own, receiving a temporary exemption from the Fed in September 1998 to get around restrictions imposed by Glass-Steagall so that it could buy Travelers Insurance.

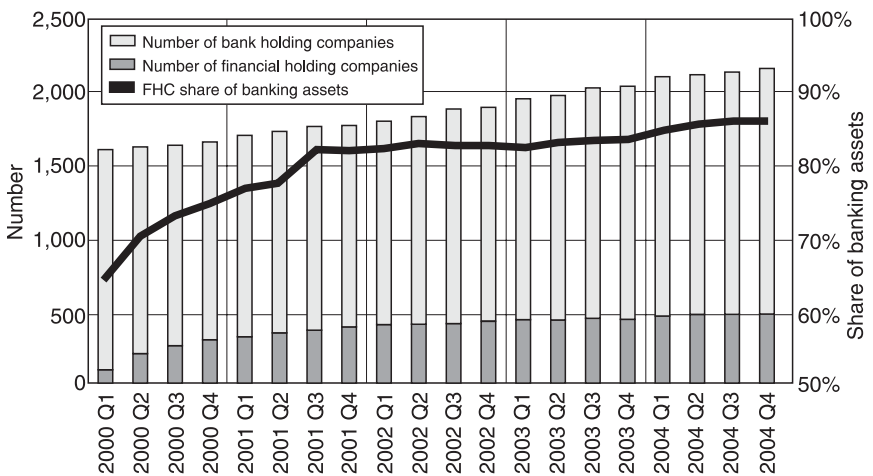
Before Gramm-Leach-Bliley, banks engaged in investment banking activities in Section-20 affiliates, so-called because they were formed in accordance with Section 20 of the Glass-Steagall Act, which prohibited banks from affiliating with other financial institutions that were “engaged principally in the issue, floatation, underwriting, public sale or distribution of financial assets.” Section 20 eventually became subject to interpretation, and following a series of court rulings and assessments by the Federal Reserve Board, bank affiliates were granted greater flexibility to engage in the underwriting of a broader array of securities. By 1996, bank affiliates were given the right to obtain as much as 25% of their revenue from underwriting corporate bonds and corporate equities. By the time Gramm-Leach-Bliley was enacted in 1999, there were already 45 Section-20 banks.¹⁶

¹⁶ Ellen Harshman, Fred C. Yeager, and Timothy J. Yeager, “The Door Is Open, but Banks Are Slow to Enter Insurance and Investment Arenas,” Federal Reserve Bank of St. Louis, *The Regional Economist*, October 2005.

Five years after Gramm-Leach-Bliley, the investment banking activities at the nation's banks had increased, although perhaps not by as much as some expected. This is partly because banks were already engaging in investment banking, as we just showed. One of the best gauges of the impact that the repeal of Glass-Steagall has had on boosting the banking industry's presence in the investment banking arena is the change in the number of *financial holding companies* (FHCs) and the share of banking assets held by FHCs. Under the Bank Holding Company Act, bank holding companies may elect to be financial holding companies, which firms must be in order to do business across the banking, insurance, and securities sectors. At the end of 2001 there were 590 FHCs, which was a sharp increase from the 94 that existed at the end of 2000.¹⁷ As Figure 6.11 shows, financial holding companies have indeed grown sharply and now account for a significant share of the banking industry's total assets. Much of that increase, however, is because most large banks elected to become FHCs shortly after passage of Gramm-Leach-Bliley. As of September 29, 2006, there were 642 of these (including foreign FHCs, which are those

FIGURE 6.11

Five years after Gramm-Leach-Bliley, financial holding companies were few in number, big in size



Source: Federal Reserve Bank of St. Louis

¹⁷ The Federal Reserve publishes these data on its Web site, at www.federalreserve.gov/generalinfo/fhc/.

whose ultimate parent is a foreign bank or other organization chartered outside the United States), from Citigroup and MetLife in New York to Rabobank in the Netherlands.

Carrying the FHC designation does not necessarily mean that a firm is engaging in insurance underwriting or investment banking. The process to become an FHC is fairly simple. To be eligible, each depository institution controlled by the banking organization must be well capitalized and well managed as of the date the company submits its declaration, and it must have a satisfactory Community Reinvestment Act (CRA) rating from its primary bank regulator, whether it be the Fed, the Office of the Comptroller of the Currency, or the FDIC. FHC elections are effective on the 31st day after the date the declaration is received by the Fed unless the Federal Reserve's board of governors notifies the company prior to that time that the election is ineffective. Even if elected, organizations that elect to become FHCs are not required to engage in any of the newly permissible activities authorized under Gramm-Leach-Bliley.

As evidence of the slow pace at which banks have decided to allocate more resources toward investment banking activities, it is notable that as of December 2004, of the 41 FHCs that held any investment banking activities at all, three organizations—Citigroup, Bank of America, and JPMorgan Chase—accounted for 72% of the total (Harshman et al., 2005). Moreover, on average, FHCs held less than 1% of their assets in investment banking subsidiaries and just 0.24% of their assets in insurance subsidiaries. These subsidiaries accounted for 7% of revenues earned by the FHCs. As for insurance underwriting, 96% of the amount of assets held by FHCs with insurance underwriting assets were held by just two firms—Citigroup and MetLife, and by early 2005 Citigroup had sold most of its life insurance business to MetLife, indicating that it believed its capital could be invested more profitably in other businesses.

THE DOMESTIC TREASURY

The business we call *domestic treasury* has historically been twofold: to fund loans and whatever other assets the bank acquired and to manage the bank's interest-rate gap based on the bank's view of interest rates.

Things have changed. Today, bank lending isn't the banking industry's main source of growth; noninterest income is (Figure 6.6). This is primarily because of the decline in net interest margins (Figure 6.5), the rise of the commercial paper market, the globalization of finance, and

deregulation, which has allowed banks to dabble in other lines of business. Banks have had to reconsider their function as primary lenders. Many banks realize that if they do not generate assets on their own, their assets might not grow much. As one banker put it, “In the past, my predecessor was just saying, ‘My cost of funds plus reserves plus everything is X ; and, banker, I need a spread.’ That is how we priced transactions. Now if we do this, we have nothing.”

Today, it is domestic treasury’s function to actively seek out assets and to fund them; to manage the interest-rate risk of the bank (no change from the past there); and depending on how the bank is organized, to trade foreign exchange, derivatives, and fixed-income securities such as Treasuries, agencies, and mortgages, all money-making activities for banks and a big source of revenue growth. For example, from the second quarter of 2005 to the second quarter of 2006, trading revenues to net operating revenues at insured commercial banks had increased to 21.6% from 11.0%. While these numbers can fluctuate, the data support the notion that trading revenues have increased as a share of total revenue.¹⁸

Reorganizing for Asset Acquisition

The idea of the bank’s treasury seeking assets to fund and manage is relatively new but fits nicely with the trend in banks to get into investment banking. “The general trend toward deregulation, our willingness to change from being a traditional lender to becoming more a securities firm, made us,” noted one banker, “move toward this organization where corporate banking becomes corporate finance, and the treasury becomes the part of the bank managing assets. In the current environment, bankers want more to be in the distribution of their liabilities, both loans and securities, and the Treasury wants more to be in the acquisition of assets to realize net interest earnings. That makes bankers and the Treasury complementary, but it calls for a change in organization.

“Instead of saying my marginal cost of funds is such and such, I have to be in an acquisition mode. We [the treasury] have to think in terms of acquiring an asset that yields LIBID [London Interbank Bid Rate], not something that pays LIBOR plus everything because my alternative (my opportunity cost) is to go out and lend money to JPMorgan Chase at LIBID.”

¹⁸ Data from the Federal Deposit Insurance Corporation’s *Quarterly Banking Report*, second quarter 2006.

Loans

Over time, it's not so much the absolute amount of loans on the balance sheet of a money center bank that has shrunk; rather it is the bank's loans as a percentage of a growing balance sheet. Noted one banker, "Our capability to originate loans has grown, but that would not have happened if our capability to distribute them had not also been built. We now have a very large loan origination and distribution business."

Today, with bankers selling loans to investors—loans made under commercial paper lines to managers of conservative liquidity portfolios, mortgage loans—the question arises, how does a bank determine which of the loans it originates it wants to keep? One bank's approach is that domestic treasury bids for the loans it wants and rejects those it does not.

Auctioning loans within the bank may not be the typical way that money center banks choose which loans to sell and which to keep, but clearly some rational criteria must be applied by every money center bank to make this choice. In that process, attention clearly must be paid to the relationship between rate and credit risk, because putting a loan on the bank's balance sheet exposes that bank to credit risk.

A bid-for-loans banker is given a credit grid; depending on the rating of the borrower and the maturity of the loan, she is charged a loan loss reserve—maybe as much as 20 bp on a triple-B loan, 5 bp on a triple-A loan. The idea of the loan loss reserve is to force the treasury to differentiate between (1) getting paid to assume credit risk and (2) earning a funding profit. "I think that in the past," one banker observed, "we had an incorrect perception of how much was made on loans. If we can now say the lending business is generating so much funding profit, so much in the amount of reserves to cover default risk, and so much to cover operating costs, then we have the three components of it—we know how much money we make on lending. Also, we can then rationally decide to lend because the ROE [return on equity] is good, or not to lend because the ROE is inadequate. Also, once we know how much we make on loans to a client, we can go on to figure out how much we make on doing other things for them—foreign-exchange trading, the placing of securities." These days many banks allocate credit lines based on the profitability they get from their customers.

Floating- versus Fixed-Rate Loans

The loans that a bank keeps on its balance sheet are almost all floating rate. "Our fixed-rate loan book is," noted one banker, "*de minimus*."

Any fixed-rate loans we originate get sold away from the bank. We may have a commitment to extend cash for five years, but the basis is all floating rate.” This asset structure explains why banks that sell 3- or 5-year, fixed-rate deposit notes immediately—in the interests of minimizing interest-rate exposure—swap the proceeds for floating-rate money.

Securities

As we’ve mentioned, banks have always held portfolios of securities, governments, agencies, and munis. What is new is the trend toward holding what often amounts to securitized loans, such as agency mortgage-backed securities, corporate medium-term notes (MTNs), car loans packaged as securities, and collateralized mortgage obligations (CMOs).

A Bank’s Taxable Bond Portfolio

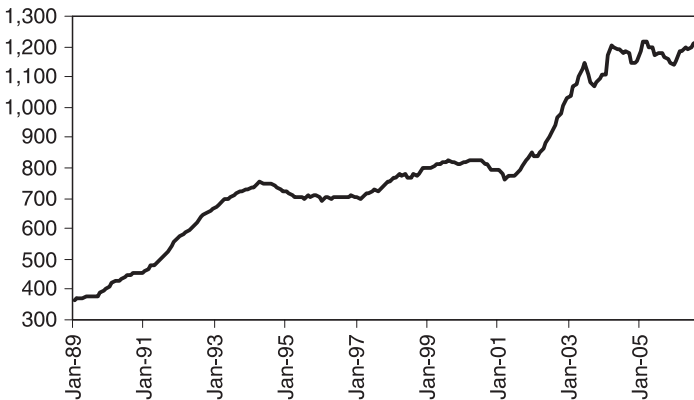
It used to be standard practice for a bank to invest a part of the funds deposited with it in government securities that could be sold to meet increases in loan demand or depositor withdrawals. A bank’s portfolio provided liquidity and some earnings.

For the nation’s largest banks, with the exception of the deposit-rich Bank of America, this began to change in the early 1960s. At that time, many large banks, particularly those in New York, found that the secular uptrend in bank loans had eaten away most of the excess liquidity (bloated bond portfolios) with which they had emerged from World War II. At the same time, corporate treasurers began to manage their cash more actively, taking idle deposits out of the banks and investing them in commercial paper and other money market instruments. This too created liquidity problems. To solve them, the banks turned to the newly invented negotiable CD and other methods for buying money. Liability management was born, and the big banks’ liquidity became in part their ability to *buy* money.

A second factor that discouraged banks from holding a bond portfolio primarily to provide liquidity was the ever-widening fluctuations that occurred in interest rates as a result of cyclical swings in economic activity and shifts in Fed policy. What the banks found was that, as loan demand slackened, interest rates would fall sharply; and as loan demand picked up, interest rates would rise sharply. In this environment, using bonds as a source of liquidity meant buying bonds at high prices and selling them at low prices. Thus, a bank that viewed its bond portfolio as a source of liquidity found buying bonds to be an automatic money loser;

FIGURE 6.12

Bank holdings of Treasuries (in billions of dollars)—changes in loan demand influence the banking industry's preference for holding government securities



Source: Federal Reserve

over time, the portfolio provided some interest income and lots of capital losses.

In the early 1990s, banks sharply increased their holdings of governments (Figure 6.12) in response to poor credit conditions in the broader economy, as evidenced by the failure of hundreds of savings and loan institutions. Bank holdings of governments then moved sideways before jumping again at the start of the 2001 recession. Following that surge, bank holdings of governments once again moved sideways. The pattern that has emerged is a familiar one: when lending opportunities either shrink or become unattractive, banks will shift their assets accordingly.

Today, since a large bank's government portfolio is financed in the repo market, it is more a *use* than a *source* of liquidity. Also, if such a bank sells securities, the repo borrowings used to finance them have to be repaid, so portfolio sales produce *no* money to fund loans or to meet other cash needs.

Maturity Choice

Because the yield curve *normally* slopes upward, a bank will get a better spread between the yield on its portfolio and its financing cost the longer it extends along the maturity scale in buying governments. This tempts a

bank building up its portfolio to buy at least some governments and agencies with 2-year, 5-year, or even much longer maturities, but doing so poses a risk.

An upturn in rates would cause not only a rise in financing costs, but a fall in the value of the securities held; and the longer the maturity of these securities, the more dramatic that fall would be. Thus, a bank with long governments might end up in a position in which rising financing costs tell it to sell governments at a time when it can do so only at a substantial loss.

To avoid getting into such a bind, banks use several strategies. One is to minimize the damage that rising interest rates can do by holding securities with short current maturities. Another is to match the maturity of the securities purchased with the time span over which interest rates are expected to be down—a policy that will result in a runoff of the portfolio as rates start up again. A third strategy, more typical of money center banks, is to count on being smart enough to know when to buy and when to sell. Both of these strategies will be successful only to the extent that the bank succeeds in predicting interest-rate trends. That, however, is difficult. Strategy three in particular is tough because the best time for a bank to buy securities is when, thanks to Fed tightening, things look bleakest, and both the curve and carry are most negative; that's when long Treasuries are generally cheapest. Conversely, the best time to sell is when everything looks best. Thus, it's not surprising that many times a large bank's portfolio could have been managed better with hindsight than it was with foresight.

Security Choice

As part of their interest-rate strategy, banks have shown increased flexibility in choosing which type of security to buy. In fact, the choice of which security to buy goes hand in hand with a bank's interest-rate forecast, because the interest-rate environment has a significant impact on the relative performance of the various segments of the bond market. For example, in a rising interest-rate environment, Treasuries tend to be preferred over other securities, mostly because when rates rise, so do concerns about the economy, which can impair the ability of various types of borrowers (homeowners, corporations, etc.) to repay their debts. These concerns about the economy are hence manifested in the performance of "spread products," or any fixed-income security that trades at a yield spread over Treasuries (all fixed-income securities). In recent years, banks

have shown that they recognize the variations that can occur in the relative performance of fixed-income securities under different types of economic and interest-rate settings.

Like most fixed-income investors, banks have shown an inclination to reach for as much yield as possible. This is evident in the current mix of securities held by the banking industry, which in June 2006 was skewed much more toward agencies and mortgage securities than toward Treasuries.¹⁹

Portfolio Management

Active portfolio management by a bank—a willingness to make judgments about interest-rates trends and adjust maturities accordingly—can significantly increase the return earned by the bank on its portfolio. Nevertheless, many banks, especially smaller ones, do not engage in such management.

Under federal tax laws, net capital gains earned by a bank on its portfolio were once taxed at the capital gains rate, while net capital losses were deductible from ordinary income. This created an incentive for banks to bunch capital gains into one tax year and capital losses into another. Managing a bank's portfolio thus boiled down to deciding whether the current year was a gain or a loss year; this wasn't difficult. If the market was up, it was a gain year; if the market was down, it was a loss year.

Tax laws were changed in 1969: all bank capital gains on portfolio transactions since then have been treated as ordinary income, and all capital losses as deductions from ordinary income. This tax change created for the first time a profit incentive for banks to actively manage their portfolios.

One reason many still don't has to do with bank accounting practices. Table 6.4 presents in bare-bones style the format of a bank income statement. Note that *two* profit figures are given.

The first figure excludes capital gains and losses; the second reflects them as well as their effect on taxes due.

The special place given to securities gains and losses on a bank's income statement highlights them as an extraordinary item, and some bank stockholders and stock analysts thus focus much of their attention on

¹⁹ For a detailed breakdown of the financial assets held by commercial banks, see the Fed's quarterly flow of funds report, section L.109 of the tables on levels.

TABLE 6.4

Typical format for a bank income statement

+ Interest income (including interest income on securities held)
– Interest expenses
+ Other operating income (including trading account profits)
– Noninterest operating expenses (including taxes other than those on capital gains)
Income before securities gains (losses)
± Securities gains (losses) net of tax effect
Net income

income before securities gains (losses). Since interest income on securities is included in this figure but capital gains and losses on securities trades are not, bankers prefer interest income from their portfolio to capital gains. Also, because stockholders and analysts like to see sustained earnings growth, bankers want this number to grow steadily from year to year.

That desire can at times discourage a bank from managing its portfolio. To illustrate, consider a bank that buys 3-year notes in a high-rate period. Two years later, interest rates have fallen, and the 3-year notes, which have moved down the yield curve, are trading at a yield to maturity well below their coupon. At this point, the bank might feel that, to maximize profits over time, it should sell these notes and buy new ones that have a longer current maturity and therefore sell at a higher yield. The logic of such an *extension swap* is that the capital gains earned immediately on the sale of the old notes plus the interest earned on the new notes would over time amount to more income than the interest that would have been earned by holding the old notes to maturity and then reinvesting. The swap, however, creates a capital gain in the current year and lowers interest income in the following year. To the banker who wants *income before securities gains (losses)* to rise steadily, such a redistribution of income often seems too great a price to pay for maximizing profits over time; so she doesn't do the swap.

A bank can put some of its portfolio into a *trading account*. The advantage in doing so is that capital gains realized in the trading account are included in the top-line income figure. The disadvantage is that

securities in this account must be valued on the bank's balance sheet at the lower of market value or cost, whereas other securities in the bank's portfolio do not. At banks, one sometimes finds an anomalous situation: The bank works hard to earn profits on the 10% to 30% of its portfolio in a trading account, whereas it leaves the rest of its portfolio largely unmanaged.

Governments versus Corporates

At a bank where the norm is active management of its taxable portfolio, a question that's sometimes kicked around is this: If we're going to acquire dollar securities, why not acquire corporates instead of Treasuries, since corporates yield more? One bank portfolio manager's answer is: "I prefer by far to have Treasuries. I can repo them and earn half the corporate spread. Also, thanks to market liquidity, governments—even 10-year governments—are *all due in one day*. The extra return we would get on corporates would not compensate us for the credit risk, the lack of liquidity, and the risk of downgrading. The market has a term for the risk of unpredictable events that turn a good credit's bonds into junk overnight: *event risk*. When good credits turn to bad, they are called *fallen angels*. Governments expose a portfolio manager to market risk, but not to event risk, although in 1998 a surge in liquidity preferences caused aged Treasuries to underperform newer ones. Such events are rare and not likely to persist for long.

"What's important in managing a government portfolio," continued the same manager, "is timing. You have enough volatility in the Treasury market to make huge money, provided that you pick the right time to acquire an asset and that you get rid of it ahead of a market downturn. That's how you can really make money, but you need flexibility to do this, and you don't have such flexibility with a portfolio of long corporates."

Still, in recent years, the low interest-rate and tight credit spread environment that has prevailed in recent years has led to a "yield grab" across the fixed-income market, including the banking industry. As a result, the data show that there has been a seismic shift in the types of securities that banks are willing to own, particularly in the early 2000s. Table 6.5 highlights this shift. Most obvious are the divergent trends between bank holdings of Treasuries versus those of corporate and foreign bonds.

TABLE 6.5

Commercial bank holdings of financial assets; amounts outstanding at end of period (in billions of dollars)

Security	2000	2001	2002	2003	2004	2005	Q2 2006
Treasury securities	184.5	162.7	205.8	132.9	110.1	97.1	101.1
Agency- and GSE-backed securities	721.8	777.4	917.9	999.5	1,096.4	1,089.6	1,168.8
Municipal securities	114.1	120.2	121.7	132.5	140.8	157.7	161.8
Corporate and foreign bonds	266.1	363.1	359.9	482.5	559.7	623.7	747.2

Source: Federal Reserve

Funding a Bank's Assets

After rate deregulation, banks had to “buy” all the monies they required to fund their assets, either by paying an explicit rate of interest or by providing checking and other services at no cost. In other words, banks could not obtain free money. Today, banks are obtaining funding for their growing assets in traditional ways, chiefly through deposits and short-term borrowings. Nevertheless, these funding sources have shown variability, making the funding choice for banks one that must be managed with plenty of attention.

Demand Deposits

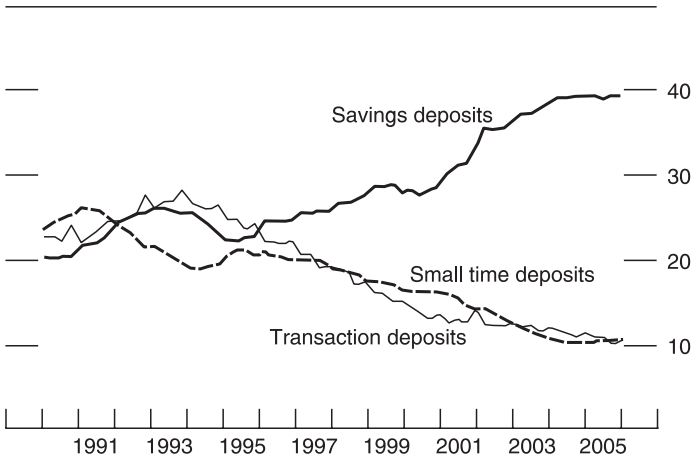
Demand deposits have traditionally been a key source of bank funding, and as such, they are an important and valuable raw material for banks. Yet, in the United States, unlike in many foreign countries, banks are not permitted to pay interest on demand deposits. So long as interest rates were low, forbidding the payment of interest on demand deposits posed no problem for banks. For bank customers, despite the fact that deposit balances offered a zero return, they tended to be willing to hold substantial demand deposits because the *opportunity cost* (forgone earnings opportunity) of doing so has often been negligible. Such was the case in the early 2000s when transactions balances began increasing sharply following a

series of interest-rate cuts implemented by the Federal Reserve. For example, M1, the Fed’s narrow gauge of the nation’s money supply consisting of checking deposits and currency in circulation, increased from about \$1.1 trillion at the end of 2000 to close to \$1.4 trillion in 2004 when the Fed began a series of interest-rate hikes. The growth was much faster than in the four years prior to that period, when M1 moved sideways. When rates began to rise in 2004, transactions balances began to fall, as the opportunity cost of holding transactions balances began to increase. These episodes show quite clearly the extent to which opportunity costs play a role in the consumer’s decision to hold transactions balances.

Putting interest-rate levels aside, in recent years consumer preferences and so-called *sweep programs* have resulted in a steady decline in demand deposits when put in the context of the growth in both the economy and in the amount of financial assets outstanding (Figure 6.13). Hence, demand deposits are no longer the reliable source of funding that they were in the past. Congress in 1982 attempted to encourage the holding of transactions balances by permitting banks to offer money market

FIGURE 6.13

Selected domestic liabilities at banks as a proportion of their total domestic liabilities, 1990–2005 (in percentage points)



Note: The data are quarterly. Savings deposits include money market deposit accounts.
Source: Federal Reserve

demand checking (MMDC) and Super-NOW (negotiated order of withdrawal) accounts specifically to compete with money funds.²⁰

Because demand deposits are valuable to banks and because holders of such deposits incur a substantial opportunity cost, an elaborate system of barter has developed in which banks trade services to customers in exchange for deposits. On small accounts, the barter involves imprecise calculations. It amounts to the bank giving free checking services to all customers or to those with some minimum balance.

On large accounts, the barter is worked out more exactly; banks provide many services to corporate and other big customers: accepting of deposits, clearing of checks, wire transfers, safekeeping of securities, custodial services, and others. In providing these services, banks incur costs that they could recover by charging fees. Instead they ask customers to “pay” by holding demand deposits.

To determine the amount of deposit balances appropriate for each customer, the bank costs each type of service it provides. It then sets up an activity-analysis statement for each account, showing the types and volume of services provided and the costs incurred. Some of the demand deposits customers leave with a bank go to meet reserve requirements; the rest can be invested. Taking reserve requirements and current investment yields into account, the bank estimates the rate of return it earns on demand deposits. Finally, using that rate, it determines what balance each account must hold so that the bank’s earnings on the account cover the costs incurred in servicing it.

A bank that requires compensating balances on lines and loans is getting at zero interest deposits on which it can earn a return. An alternative

²⁰ The Depository Institutions Act was passed by Congress in September 1982. To help banks and thrifts compete with money funds, the act required the Depository Institutions Deregulatory Committee (DIDC) to establish, which it did in December 1982, a new account—dubbed the *money market deposit account (MMDA)*—that carries *no* interest-rate lid and *no* withdrawal penalties. A depositor with such an account could each month make three preauthorized transfers from it and write three checks on it. The account, whether at a bank or thrift, resembles in many respects a money-fund account but has the added attraction to depositors of carrying federal insurance from the FDIC or the FSLIC on deposits up to \$100,000. In January 1983, the DIDC also permitted depository institutions to offer checking accounts paying unregulated rates. These accounts, quickly dubbed *Super-NOW accounts*, were initially available to consumers only.

The 1982 Banking Act also stipulated that all interest-rate controls on bank accounts as well as the $\frac{1}{4}\%$ advantage S&Ls enjoyed over banks on the rates they might pay on time deposits had to be phased out by January 1984, two years earlier than scheduled in the 1980 Banking Act.

way it could earn the same return would be to charge a fee for lines and higher rates on loans. Some customers prefer this approach, and it has become more common for banks to grant fee lines and to quote two loan rates, a standard rate for loans with balances and a higher rate for loans without. For some public utilities this approach is mandatory since regulators will not permit utilities to hold large idle balances.

To the extent that banks obtain demand deposits either from retail customers by establishing expensive branch networks²¹ or from large depositors by exchanging services or reducing lending rates, the banks are paying some implicit rate of interest on such deposits even though the nominal rate is zero. Moreover, the *all-in* cost of demand deposits is still higher than this implicit rate because the reserve requirement on demand deposits for large banks is currently as high as 10%, depending upon the amount of transaction deposits held by the bank (see Chapter 9 for more details). This means that such a bank can invest only \$90 of every \$100 it takes in. Also, most banks must pay the Federal Deposit Insurance Corporation (FDIC) a premium on deposits they accept. The Deposit Insurance Funds Act of 1996 prevents the FDIC from charging insurance premiums against well-capitalized banks if the deposit insurance fund exceeds its designated 1.25% reserve ratio. Today, less than 10% of insured depository institutions pay FDIC insurance premiums.

However high the all-in cost of demand deposits may be, banks are nonetheless eager to obtain all the demand deposits they can because the quantities of these deposits have been fairly stable and predictable over time. Nevertheless, the predictability of the quantity of demand deposits has shrunk over the years, owing to changed consumer preferences and retail sweep accounts. These days, consumers are capable of shifting their deposits out of their checking accounts into other accounts such as interest-bearing money market funds at the click of a mouse. Moreover, banks often “sweep” any monies that consumers leave in their checking accounts into money market demand accounts. Banks do this in order to avoid the reserve requirement associated with holding transactions balances. In the past, practices geared toward avoiding reserve requirements were met with rebuke by the Fed; thus far, the Federal Reserve Board has not shown any objection to sweeps programs, although the Fed’s Regulation D attempts to limit withdrawals from money market

²¹ Campbell (2005) estimates that a typical branch costs between \$1.5 million and \$2.5 million to build and up to \$800,000 per year to staff and maintain.

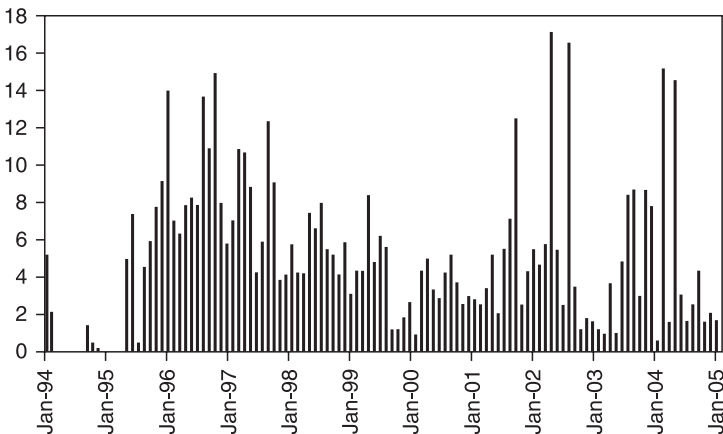
demand deposits by limiting to six the number of withdrawals that can be made from them during a calendar month (these limits do not apply to withdrawals made by personal visits to a branch, via an ATM, or by phone). Figures 6.14 and 6.15 show the large amount of sweeps activity that occurred between January 1994 and January 2005.

Banks also attach importance to demand and time deposits for other reasons: regulators like to see a lot of deposits as opposed to bought money on a bank's balance sheet; banks are typically ranked by deposit size rather than asset size; and bank analysts attach what is probably undue importance to the share of deposits in a bank's total liabilities.

While exchanging services for deposits has enabled banks to retain substantial amounts of demand deposits, banks, until introduction of the money market deposit accounts (MMDAs) and Super-NOW accounts, had no way to bid for additional funds from this source. The demand deposits they got were limited to the amounts consumers chose to leave with them plus the amounts needed to cover the services large customers chose to buy from them. This contrasted sharply and still does with the situation in the Euromarket where banks bid actively for deposits of all maturities, including call and overnight money (Chapter 7). This is probably one of

FIGURE 6.14

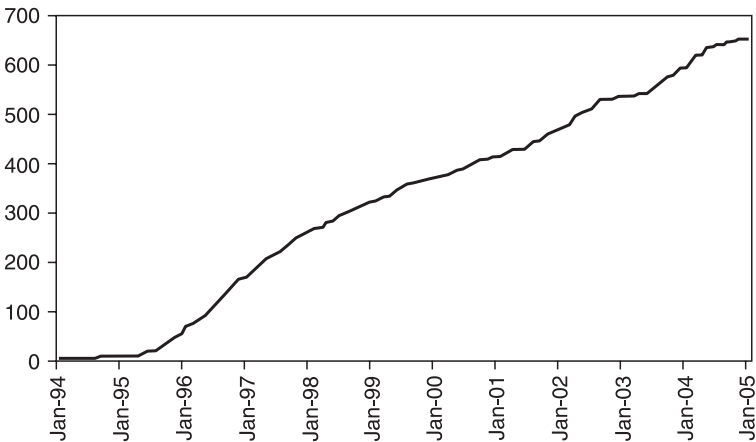
Monthly sweeps of monies from transactions accounts to money market demand accounts, 1994–2005 (in billions of dollars)



Source: Federal Reserve Bank of St. Louis

FIGURE 6.15

Cumulative sweeps of monies from transactions accounts to money market demand accounts, 1994–2005 (in billions of dollars)



Source: Federal Reserve Bank of St. Louis

the reasons why the Federal Reserve Board has asked Congress to allow depository institutions to pay interest on demand deposits, citing the request as one of the board's three highest proposals for regulatory reform.²² The Fed argues that allowing banks to pay interest on demand deposits would improve the overall efficiency of the U.S. financial sector and would in particular help small banks in attracting and retaining business deposits. As Olson put it,

To compete for the liquid assets of businesses, banks have been compelled to set up complicated procedures to pay implicit interest on compensating balance accounts and they spend resources—and charge fees—for sweeping the excess demand deposits of businesses into money market investments on a nightly basis. Small banks, however, often do not have the resources to develop the sweep or other programs that are needed to compete for the deposits of business customers. Moreover, from the standpoint of the overall economy, the expenses incurred by institutions of all sizes to implement these programs are a waste of resources and would be unnecessary if institutions were permitted to pay interest on demand deposits directly.

²² Based on testimony on "Regulatory Relief" delivered by Federal Reserve Governor Mark Olson before the Senate Banking Committee on June 21, 2005.

The costs incurred by banks in operating these programs are passed on, directly or indirectly, to their large and small business customers. Authorizing banks to pay interest on demand deposits would eliminate the need for these customers to pay for more costly sweep and compensating balance arrangements to earn a return on their demand deposits.

This latest effort by the Fed shows how the banking industry is continuing to evolve from practices in place for decades. Slowly but surely.

Time Deposits

The all-in cost of time-deposit money to a bank depends in part on the reserves the bank must hold against such deposits. Currently, unlike transaction accounts,²³ there are no reserve requirements on nonpersonal time deposits, making them a fairly attractive source of funds for banks. Nevertheless, as Figure 6.13 shows, as with transaction deposits, consumers have been shying away from time deposits over the past decade, probably finding other places to put their money.

Federal Funds

We discuss federal funds in greater detail in Chapter 12, but we lay some groundwork for that chapter in this section.

Smaller banks typically receive more deposits than they need to fund loans, whereas large banks are in the opposite position. The logical solution to this situation, in which small banks have excess reserves and large banks suffer reserve deficiencies, would be for large banks to accept the excess reserves of smaller correspondent banks as deposits and pay interest on them, a practice that used to be common before banks were forbidden in the 1930s to pay interest on demand deposits.

To get around this prohibition, the federal funds market, somnolent since the 1920s, was revived during the 1950s. In this market, banks buy *fed funds* (*reserve dollars*) from and sell fed funds to one another. Since purchases of fed funds are technically borrowings instead of deposits, banks buying fed funds are permitted to pay interest on these funds. The all-in cost of fed funds to the purchasing bank is the rate paid plus any brokerage and transactions costs incurred. Because fed funds purchased are not deposits, there is no FDIC insurance premium required on them.

²³ Transaction accounts consist of demand deposits, automatic transfer service (ATS) accounts, NOW accounts, share draft accounts, telephone or preauthorized transfer accounts, ineligible bankers' acceptances, and obligations issued by affiliates maturing in seven days or less.

They are also not subject to reserve requirements, since the reserve requirement has been met by the bank that accepted as a deposit the funds sold.

Most sales of fed funds are made on an overnight basis, but some are for longer periods. Overnight transactions in fed funds provide the purchasing bank with a cheap source of money and a convenient way to make sizable day-to-day adjustments in its reserves. For the selling bank, fed funds sold provide a convenient form of liquidity. Small banks, unlike large money center banks, cannot count on being able to buy funds whenever they need them. Therefore, they must keep their liquidity resident in their assets, and because overnight sales of fed funds can be varied in amount from day to day, they give such banks flexibility to adjust to the daily swings that occur in their reserve positions.

Banks monitor more closely the credit risks they assume by selling fed funds. They will sell fed funds only to banks to which they have established lines of credit, and they will sell to these banks only up to the amount of the lines granted. In establishing a line to another bank, the selling bank will consider the other bank's reputation in the market, its size, its capital structure, and any other factors affecting its creditworthiness. The selling bank may also consider whether the buying bank is at times also a seller of funds. A bank that is always a buyer is viewed less favorably than one that operates both ways in the market. Selling funds is also important for a would-be buyer because the fed funds market is one into which some banks have to buy their way. They do this by selling funds to a bank for a time and then saying to that bank, "We sell funds to you. Why don't you extend a line to us?"

Repos

In Chapter 13 we discuss the repo market in detail, but look at it here in the context of repo as a funding option for banks.

The emergence of the fed funds market gave banks a backdoor way to pay interest on demand deposits received from other banks. Corporations, state and local governments, and other big nonbank investors that have funds to invest for less than 30 days can't, however, sell that money directly in the fed funds market because they are not banks. Partly to meet the needs of such investors, the repo market has developed into one of the largest and most active sectors of the money market, with \$3.4 trillion of repurchase agreements outstanding in September 2006. In the repo market, banks and nonbank dealers create each day many billions of dollars worth of what resemble interest-bearing demand deposits.

In fact, an investor that does a repo transaction with a bank is making a loan secured by U.S. Treasury or other securities; investing in repos thus exposes the investor to less credit risk than depositing funds directly in the bank would.

A large percentage of all repos done by banks are on an overnight basis, but term repos are also common. Since the yield curve typically slopes upward, the rate on term repos normally exceeds the overnight rate, with the spread being larger the longer the maturity of the term repo. Thus, from a cost point of view, an overnight repo tends to be more attractive. However, excessive reliance on overnight repos and purchases of fed funds may create a shorter book (a greater mismatch between asset and liability maturities) than a bank wants to run. If this happens, the bank can use term repos to anchor its book.

Since the repo money a bank buys is not deposits, it pays no FDIC premiums on such funds. It also incurs no reserve requirements on money purchased in the repo market provided that the collateral used is government or federal agency securities. Repo transactions always involve some clearing charge. Banks doing a lot of repo carefully track these and other costs because they can raise significantly the all-in cost of repo money, especially if it is bought on an overnight basis. To avoid clearing charges, banks prefer to do repos with customers who will leave with them for safekeeping the securities “purchased.”

The overnight repo rate is normally a few basis points below the overnight fed funds rate for two reasons. Lenders in this market lack direct access to the fed funds market. Also, doing repo does not expose the lender to the same credit risk that selling fed funds would. The banks' main alternative to buying funds in the term repo market is buying term fed funds. The decision between the two is likely to be made strictly on the basis of which sells at the lower all-in cost. Normally this will be term repo, which tends to trade below term fed funds for the same reasons that overnight repo money is normally cheaper than overnight fed funds.

Because repo money is cheap and because a money market bank buys lots of it, such banks carefully search out and cultivate big investors in repo. They make it a point to know the needs of their big customers—whether they can buy commercial paper, repo, or whatever—and they call these customers every day to get a feel for what monies they have available. The banks also keep track of who is issuing bonds and who is therefore going to get big money. For example, if California floats a \$1 billion or \$3 billion bond issue to obtain funds that it intends to pay out to school

districts two months hence, every money market bank will know that the state has money to invest in repo, and they will all be calling the state to get some of it.

Doing repo with customers is the way banks get most of the repo money they buy. However, banks that are primary dealers in government securities also frequently do repo transactions with the Fed and reverses as well. As explained in Chapter 9, the Fed relies heavily on repos and reverses with dealers in governments to make short-term adjustments in bank reserves.

Eurodollars

A major source of funding to which a bank may turn is the Eurodollar market, where it can bid for deposits (*take* money) of essentially any maturity from overnight on out. A bank can also invest (*place*) money it has raised in the domestic market in Eurodollar time deposits. It is a little-known fact outside the banking industry that banks borrow more money in the Eurodollar market than they do in the fed funds market (Chapter 18). This is partly because of the favorable way in which Eurodollar deposits are treated by the Fed with respect to reserve requirements. The reserve requirement on Eurodollars is established under *Regulation D*, which once required a domestic bank to hold reserves equal to 3% of any *net* borrowings (borrowings minus placements) in Eurodollars that it made for its domestic book over a seven-day averaging period. Because of Reg D, a bank that took Eurodollars of one maturity would often place Eurodollars of some other maturity during the averaging period so that its reserve cost on the money borrowed was zero. Today, the reserve requirement on Eurodollar deposits is zero, having been eliminated at the end of 1990.

The head offices of money market banks are very active in the Eurodollar market for several reasons. First, banks are attracted by the lack of reserve requirements imposed on Eurodollar deposits. Second, the Eurodollar market is a global market that trades with an abundance of liquidity. Third, staying active in the Eurodollar market helps banks to establish relationships with major firms as well as gain insights into market conditions worldwide. Finally, banks are constantly alert to the opportunities for arbitrage between the domestic and the Eurodollar markets that arise because of transitory rate discrepancies.²⁴ These opportunities are rare, but a bank can sometimes pick up a basis point or two.

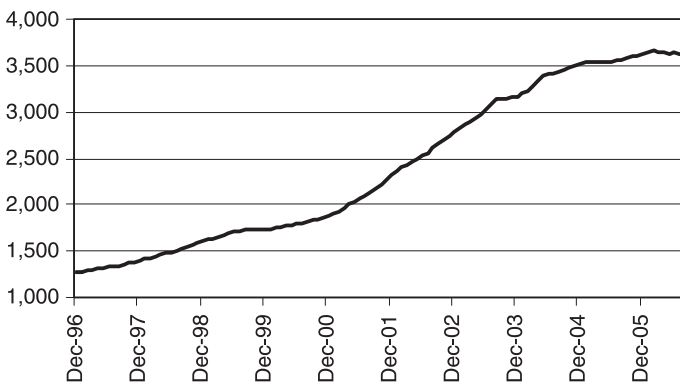
²⁴ Strictly defined, to *arbitrage* means to buy something where it is cheap and to sell it where it is dear.

Savings Deposits

We show earlier in Figure 6.13 the steady decrease that has occurred in the amount of transaction deposits and time deposits held by the nation's banks as a proportion of total assets. The chart also shows a concomitant rise in the amount of savings deposits held by banks. Indeed, by the end of 2005, savings deposits (including money market demand accounts) represented 30.9% of bank liabilities, a sharp increase from 1996 when they accounted for 19.1% of liabilities.²⁵ One reason is because savings deposits are relatively inexpensive for banks to carry, with the interest-rate levels paid on savings deposits lagging behind those of other deposits as well as the fed funds rate. Bankers are also attracted to savings deposits because savings deposits are fairly reliable and generally predictable. Savings balances do not fluctuate much, and when they do, it is because of fluctuations in interest-rate levels. Higher rates, for example, tend to attract depositors, and low rates tend to discourage depositors. Figure 6.16 illustrates the variability that can occur in the amount of savings deposits resulting from fluctuations in interest rates. As the chart shows, savings deposits leveled off in 1999 when the Federal Reserve delivered its first of seven interest-rate hikes lasting through May 2000. Then, in 2001, when

FIGURE 6.16

Savings deposits held in the United States (in billions of dollars)



Source: Federal Reserve

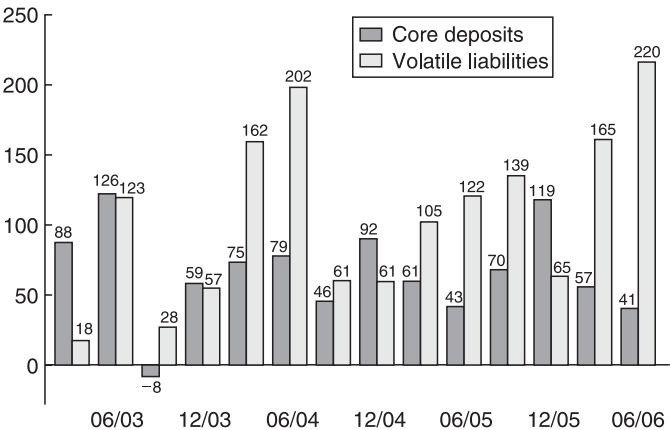
²⁵ When a depositor places money in a bank, it is a bank liability—the bank owes the money to the depositor.

the Fed began a series of interest-rate cuts, savings deposits rose again. These fluctuations show that when interest rates rise, consumers begin to seek higher yields elsewhere, owing to the laggard nature of interest rates paid on savings deposits. When interest rates fall, consumers become somewhat indifferent to holding savings deposits, and hence their savings balances rise.

In light of the connection between interest-rate levels and the preference for holding savings deposits, bankers must be cognizant of the impact that interest-rate levels could have on this important source of funding. Figure 6.17 illustrates the sharp variability that can occur in the mix of funding sources that bankers must choose from when stable sources of funding fluctuate. As the chart shows, shortfalls in *core deposits*, which include all deposits in domestic offices other than time deposits in denominations of \$100,000, have to be offset by increases in more volatile sources of funding such as large-denomination time deposits, federal funds and Eurodollar borrowings, and foreign office deposits, if a bank is to fund its assets. In 2006, increases in both official rates and market interest rates reduced the attractiveness of low-paying, laggard savings deposits, leading consumers to seek alternatives. In the second quarter of 2006, core deposits increased by just \$41.5 billion, the smallest increase

FIGURE 6.17

With core deposits lagging asset growth, banks have become more dependent on managed liabilities (quarterly changes in billions of dollars are shown)



Source: Federal Deposit Insurance Corporation

in three years. In turn, the banking industry's dependence on other sources of funding jumped to a record level.²⁶

Asset-Liability Management

As noted, the Treasury business of a bank involves not only acquiring assets and funding them—building in an interest-rate spread—but gapping, betting on strongly held views on interest rates. “On the trading floor where I work,” noted one banker, “we focus on interest income, which involves being right on the market day to day. We have a group that is continually monitoring the interest-rate gaps of the firm and trying to decide whether, in the context of the market, it wants to be long or short.”

Asset-liability management (ALM), also known as *gap management*, is the term used to describe the various techniques that banks deploy to manage the risks associated with the impact of changes in interest rates on a bank's mix of assets and liabilities, with the objective of maintaining a positive interest-rate spread. Asset-liability management was once a simple process, but the days of “3-6-3” banking (see the discussion earlier in this chapter on this) are over, and today banks must assess their asset-liability risks in many different layers, from core deposits and loans, to complex derivatives positions.

The Evolution of Swaps in Gap Management

It is probably typical of money market banks that they first began to use swaps to convert fixed-rate borrowings to floating-rate borrowings. Doing so helps banks to directly address their asset-liability risks by removing either assets or liabilities from their asset mix. The securitization of bank assets—mortgages in particular—plays a major role in this regard, facilitating the removal of assets from a bank's balance sheet. After first recognizing the benefit of swaps to convert fixed-rate borrowings to floating ones, money market banks saw the potential for using swaps in gap management: by becoming a receiver of fixed, they could acquire a synthetic, medium-term, fixed-rate asset.

One banker recounted his bank's experience: “As our medium-term loans were contracting from the viewpoint of funding, there was a bull market in medium-term paper, and our credit rating was improving; so a lot of customers were calling us wanting to buy fixed-rate, medium-term

²⁶ Federal Deposit Insurance Corporation, *Quarterly Banking Report*, second quarter 2006.

liabilities of the bank. We had no immediate need for such funding, since we had no equivalent loans to finance. So, we came into the swap market as an end user. We did this very much on a matched-book basis, turning medium-term, fixed-rate liabilities into medium-term, floating-rate liabilities. From there, we developed into an outright trader of interest-rate swaps. The next step was that we began to use interest-rate swaps in much the same way that a traditional asset-liability manager would use Treasuries. When we were constructive on the market, convinced that rates would come down, we would not only buy Treasuries, but start doing swaps in which we were receivers of fixed.

“That is where we started, and certainly the majority of the top 100 banks in the world are at that level of sophistication now. They use interest-rate swaps not only to match up assets and liabilities, but as a tool for gapping: instead of putting medium-term Treasuries on the balance sheet, they now use swaps as an off-balance sheet way to acquire a fixed-rate, term asset.”

In a bank, it is typical to have a group of traders running a hedged swap book. If the bank’s treasury wants to receive fixed as an asset play, it will often do the trade directly with its swap group, which will in turn hedge that position until it is able to lay it off (Chapter 19). To keep its swap group “honest,” a bank’s treasury will, as an end user of swaps, probably reserve the right to get quotes from and also to transact swap business with other dealers.

There are many other areas of a bank’s business where asset-liability management is deployed. One of these is in its trading operations. In this case, banks use derivations of asset-liability management that attempt to either control or assess the amount of risk on the bank’s books. For example, bank managers impose *risk limits* that dictate the amount of risk that a trading operation can take. These can be defined as either market risks or credit risks. In a money market or other fixed-income portfolio, these risks can be defined by portfolio duration, average maturity, convexity, foreign-exchange exposure, or credit ratings, for example. In a large organization, risk exposures will reside in many layers of the bank, making it necessary for asset-liability managers to track the cumulative amount of risk being taken by the bank, particularly as it relates to the total amount or risk the bank will tolerate. For example, if the bank’s foreign-exchange trading operation is exceeding its risk limit, that added risk reduces the amount of risk that other areas of the bank can take—that is, if the bank wants to allow the foreign-exchange department to take the added risk in

this instance and for overall risks to stay within the confines of the risks that the bank previously dictated it should take.

Value at risk (VAR) is an example of a risk metric that banks use as a means of determining the amount of risk it is exposed to. VAR takes a probabilistic approach to measuring the risks to a portfolio associated with market volatility. One of the metrics that can be deployed in a VAR model is historical volatility, which basically looks at the typical percentage changes that occur in a financial instrument over a period of time. The Basel Committee on Banking Supervision implemented market-capital risk requirements on banks based on VAR analyses, giving banks the option of using their own VAR systems under certain conditions. A key objective was to address systemic risks that might be posed from the growing use of derivatives.

Interest-Rate Futures as a Tool of Gap Management

By regulation, banks are supposed to use futures only to hedge. But in point of fact, banks have so many assets and liabilities on their books that they can defend almost any position they might take in futures, from the 3-month Eurodollar to the T-bond contract, as a hedge. Consequently, bankers regard and use futures as one more tool of gap management. If a bank wants to be long, it may at times make more sense for it to buy futures than for it to buy cash instruments. Futures are off-balance sheet, and at least Eurodollar and Treasury futures possess the virtue of being highly liquid. A long in futures—like receiving fixed on a swap—can be an attractive alternative from the point of view of gapping; both will give a gap manager the approximate rate play of being long in Treasuries, provided she pays due attention to the factors affecting spread relationships and relative liquidity. Banks with large amounts of exposure to the mortgage market often trade futures, in some cases in very large sizes. Some of these banks are also major players in the options markets, holding literally tens of thousands of contracts at a time in a few cases.

Asset-Liability Management in Action

The following quote gives the flavor of how an asset-liability manager at a big bank operates: “Within the context of a \$60 billion balance sheet, we can generally find a way to describe a futures position as a hedge. That being the case, the issue becomes at the margin: Do I want to use a future, an interest-rate swap, an option, a Treasury, an interbank time deposit,

a whole loan, or a mortgage? You couldn't do this with your entire portfolio, but you can do it with a chunk of the portfolio.

"You employ traders who are specialists, and you allow them a degree of freedom which means that if your swap trader likes the market, she will probably use swaps to express her view. That is fine as a way of training people, as a way of keeping the institution sharp, as a way of diversifying some of your risk, and as a way of being involved across markets. But there needs to be a management group within the institution that looks at relative value and that is prepared to shift the firm's capital so that you pursue relative value more efficiently. That group has several decisions to make: As an institution, should we be making a bet on interest rates? If so, on what part of the curve and in what product should we place our bet?

"You can look at matrices of relative yields, convexity, and the rest of it—as between options, mortgages, whole loans, futures, swaps, notes, credit derivatives, and bonds—and make that decision. You can generally do good size in the swap market; you can generally do good size in the futures market, but there your maturities will be more limited; you can clearly do good size in the Treasury market; beyond that, there are limitations. The options market falls on the far side of the dividing line, for example. At times, buying options may be more efficient and more liquid than buying a weak issuer's 3-year car loans or something. At other times, the reverse may be true. You have to look at both price and your confidence in your ability to unwind the transaction."

THE DISTRIBUTION BUSINESS

From what we've said about where banks are moving in the aftermath of the fall of Glass-Steagall and about the increasing tendency of banks to remove both their loans and the risks from their balance sheets, it's clear that for banks to get where their current strategies are leading them, they must continue to build distribution. That should be the least difficult of the tasks currently facing them, since money center banks have long had sizable and highly professional staff trading securities. For them, the principal challenge is expanding product line into the array of choices allowed under Gramm-Leach-Bliley, both explicitly and implicitly depending upon how a bank decides to interpret the regulatory treatment of new products.

BANK CAPITAL ADEQUACY

We discussed earlier the importance of Basel and how Basel II will influence banks in the years to come. In talking about bank capital adequacy, the first thing to note is that the essence of banking is for a bank to raise the return on its equity capital through leverage.

Leverage

To illustrate *leverage* at work, here's a simple example. Suppose an investor has \$1 million of capital to invest. He can borrow additional funds at 5%, and he can invest at 7.5%. If he invests only his \$1 million of capital, he will earn \$75,000 for a return of 7.5% on that capital. If alternatively he borrows \$5 million and invests a total of \$6 million, he will have an investment income of \$450,000, interest costs of \$250,000, and profits of \$200,000, which amount to a 20% return on his \$1 million of capital (Table 6.6). By borrowing funds at a low rate and investing them along with his capital at a higher rate, our investor has raised the return on his capital.

Unfortunately, there's an unforgiving symmetry to leverage because the elimination of capital on the way down can sap any euphoria derived from gains made on the way up. If our investor, who anticipated earning 7.5% on his investment, earned only 2.5%, then his profit would be -\$100,000 for a rate of return capital of -10% (Case III, Table 6.6).

Because bankers operate with borrowed funds that amount in total to a substantial multiple of their capital, they engage in leverage on a grand scale. Moreover, because assuming both a credit risk by lending and a rate risk by running a short book are fundamental elements of banking, the banker can never be sure either what average return she will earn on her assets or what her cost of funds will be. The purpose of bank capital is to cushion bank depositors and other suppliers of debt capital to banks against any losses the bank might incur resulting from unfavorable leverage—borrowing costs higher than return earned.

Past Views of Capital Adequacy

While it's easy to see that a bank needs capital, the question of how much is difficult, perhaps unanswerable. In attempting to measure bank capital adequacy, the yardstick used to be the ratio of a bank's deposits to its

TABLE 6.6

Leverage at work: Investor has \$1 million of capital

Case I: No borrowed funds used; investment returns 7.5%:

$$\text{Investment income} = 7.5\% \times \$1,000,000 = \$75,000$$

$$- \text{Interest cost} = 5\% \times 0 = 0$$

$$\text{Profit} = \$75,000$$

$$\text{Rate of return on capital} = \frac{\$75,000}{\$1,000,000} = 7.5\%$$

Case II: \$5 million of borrowed funds costing 5% used; investment returns 7.5%:

$$\text{Investment income} = 7.5\% \times \$6,000,000 = \$450,000$$

$$- \text{Interest cost} = 5\% \times \$5,000,000 = \$250,000$$

$$\text{Profit} = \$200,000$$

$$\text{Rate of return on capital} = \frac{\$200,000}{\$1,000,000} = 20\%$$

Case III: \$5 million of borrowed funds costing 5% used; investment returns 2.5%:

$$\text{Investment income} = 2.5\% \times \$6,000,000 = \$150,000$$

$$- \text{Interest cost} = 5\% \times \$5,000,000 = \$250,000$$

$$\text{Profit} = -\$100,000$$

$$-\$100,000 = -10\%$$

$$\text{Rate of return on capital} = \frac{-\$100,000}{\$1,000,000} = -10\%$$

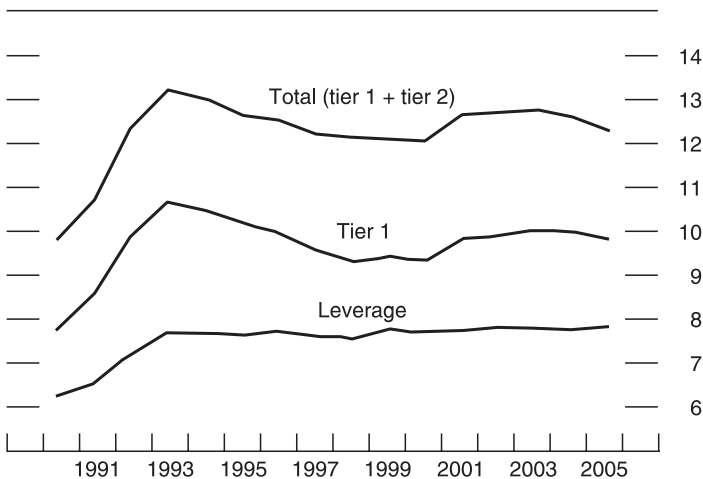
loans, its major risk assets. Then as banks became active buyers of money, focus shifted to the ratio of equity to total risk assets. However well or poorly this ratio may measure bank capital adequacy, it in no way solves the question of what minimum value the ratio should have. For every \$1 of capital, should a bank borrow at most \$10, \$20, or what? Any intelligent answer to this question should probably be based on a bank's earning power as measured by certain historical indexes and modified to allow for the past debt experiences, particularly if the bank has had a run of bad debts against it. Such numbers, however, will vary from bank to bank, suggesting that an industrywide standard can't be easily set.

As a practical matter, the capital ratios that prevailed in banking in the past in no way reflected reasoned decisions by either bankers or

regulators as to what these ratios should be. To the contrary, what they were at any point reflected historical evolution and prevailing economic conditions. In particular, during the post–World War II period, as loan demand surged and banks strove for continued earnings growth, bank capital ratios declined substantially. The trend lasted until the early 1990s following the savings and loan crisis before improving. Since then, however, bank capital has increased to levels that regulators consider healthy. Figure 6.18 shows the relatively stable condition of bank capital that existed between 1990 and 2005. As the chart shows, capital levels increased sharply in the early 1990s, reflecting both the end of the savings and loan crisis and the effects of Basel I, which imposed higher capital standards on the banking industry. Since then, capital levels have moved largely sideways. In recent years, regulatory capital ratios have fallen slightly, reflecting a shift in the banking industry’s mix of securities holdings. In particular, banks reduced their holdings of Treasury securities, which carry no risk weight for regulatory purposes, while increasing their holdings of mortgage-backed securities, which carry a 20% risk weighting. In addition, commercial and industrial (C&I) lending increased sharply, particularly in 2004 and 2005, putting downward pressure on capital ratios because C&I loans

FIGURE 6.18

Regulatory capital ratios, 1990–2005 (in percentage points)



Note: The data are as of year-end. For the components of the ratios, refer to footnote 27 of this chapter.
Source: Federal Reserve

carry a relatively high risk weighting. The combination of these developments brought the ratio of tier 1 capital of all risk-weighted assets to a shade below 9.9% at the end of 2005.²⁷

Since the whole question of capital adequacy boils down to asking how much capital a bank needs to ensure its survival under unknown future conditions, it is no surprise that neither bankers nor regulators have definitively answered this question. The typical U.S. banker's motto, in determining what minimum capital ratio her bank should maintain, used to be: *stay with the herd*. Banking tends to be a homogeneous industry and as such is characterized by pattern thinking. A banker used to judge her leverage ratio to be high or low in terms of where she was vis-à-vis her peers. If the pack let their capital ratios fall, she was comfortable to follow, but she did not want to lead. This attitude made sense because the Fed tended to judge banks against the pattern of what their competitors were doing. Also, bank customers, who watch leverage carefully, were ever ready to penalize a bank that got out of line.

BANK REGULATION

U.S. banks and foreign banks operating branches in the United States are highly regulated with respect to what they may do. As background, we present in an appendix to this chapter a short description of major U.S. banking acts.

Banking in America is often referred to as a “dual” system because some banks operate under federal charters obtained from the Office of the Comptroller of the Currency (OCC), while others are chartered by the states. U.S. bank regulation comes in layers. State banks are regulated by

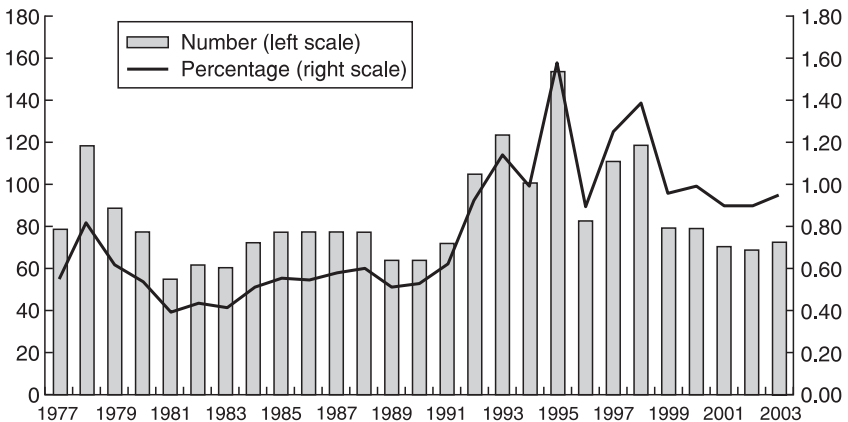
²⁷ According to the Federal Reserve, tier 1 and tier 2 capital are regulatory measures. Tier 1 capital consists primarily of common equity (excluding intangible assets such as goodwill and excluding net unrealized gains on investment account securities classified as available for sale) and certain perpetual preferred stock. Tier 2 capital consists primarily of subordinated debt, preferred stock not included in tier 1 capital, and loan-loss reserves up to a cap of 1.25% of risk-weighted assets. Risk-weighted assets are calculated by multiplying the amount of assets and the credit-equivalent amount of off-balance sheet items (an estimate of the potential credit exposure posed by the items) by the risk weight for each category. The risk weights rise from 0 to 1 as the credit risk of the assets increases. The tier 1 ratio is the ratio of tier 1 capital to risk-weighted assets; the total ratio is the ratio of the sum of tier 1 and tier 2 capital to risk-weighted assets.

Exposures consist of lending and derivatives exposures for cross-border and local-office operations. Respondents may file information on one bank or on the bank holding company as a whole.

state banking authorities, national banks by the comptroller; the Fed has its say; and the FDIC regulates insured banks.²⁸ Banks actually have the option of which agency it would like to be regulated by. Banks that choose to be nationally chartered are choosing the OCC as its regulator; banks that choose to be state chartered will have either the Fed or the FDIC as its primary regulator. Many banks often switch regulators, with over 10% of banks having done so in the period 1977–2003.²⁹ Figure 6.19 highlights this historical pattern. Of the switches that occurred during the period, 779 banks switched following a merger, accounting for about a third of all switches. Merger-related switches accelerated following the Riegle-Neal Act which removed the restrictions on interstate branching. The other switches that occurred during the period were motivated by assessments of regulation costs, which include managerial, accounting, and legal costs, some of which are associated with having to meet the regulatory bank examiners (the OCC and the FDIC charge for exams; the Fed does not, although state examiners do). Other considerations include the differences in the types of assets that banks can own.

FIGURE 6.19

Banks that switched primary federal regulators, 1977–2003



Source: Data from Federal Deposit Insurance Corporation, 1977–2003, reports of income and condition, Washington, DC, and the Federal Reserve Bank of Chicago.

²⁸ Lest anyone think that layers of regulation preclude bank failures, consider that in the United States there were hundreds of bank failures in the early 1990s.

²⁹ Richard J. Rosen, “Switching Primary Federal Regulators: Is It Beneficial for U.S. Banks?” Federal Reserve Bank of Chicago, *Economic Perspectives*, third quarter 2005.

A key drawback of having multiple regulators falls on the backs of regulators. As Rosen (2005) notes, when Chase Manhattan Bank elected to have a state rather than a national charter, subsequent to its merger with Chemical Bank in 1995, the Office of the Comptroller of the Currency (OCC) lost fees amounting to 2% of its annual budget. An even bigger impact was JPMorgan Chase's merger with Bank One in 2005. Its switch back to a national charter cost the New York Banking Department (the state regulator) 27% of its revenues. A danger is that concerns over the potential loss of a "customer" could lead to misguided regulatory changes resulting from a regulator's desire to keep banks from switching.

The overlap in bank regulation has led to periodic calls for a single unified system of bank regulation. However, movement in this direction seems unlikely because state banks, which are numerous and have considerable clout in Congress, are anxious to preserve a system in which the primary responsibility for regulating them lies with the local state banking authority; these banks fear being forced into a single national banking system.

Fortunately, the regulatory overlap is less than appears on paper. Often the state regulators will focus on checking the accuracy of the bank's audited statements, whereas examiners from the Fed will be more concerned with whether the bank is being properly run. There are also many benefits to having multiple regulators (Rosen, 2005). For starters, multiple regulators might allow banks greater flexibility in undertaking new powers and using new products as opposed to a single regulator, which might be more tentative about granting such flexibility out of fear of being singled out as responsible if events that follow go awry. In this case, the presence of multiple regulators means that if one regulator says no to a certain proposal, another might say yes. Another benefit of multiple regulators is regulatory competition, which can help to optimize the formulation of bank standards.

The regulations under which U.S. banks operate are numerous, detailed, and complex. Perhaps one reason is the checkered history of the U.S. banking system, which periodically experienced waves of failures and suspensions of payments right up into the 1930s. A second reason is that flexible regulation may be impractical in a country where there are about 8,000 different banks, a situation unparalleled in any other major country.

Many people, particularly members of Congress, feel that if the regulators were doing their job, no bank would have problems and that the existence of problem banks indicates the need for more or better regulation.

The nature of banking is taking risks by lending and by doing some maturity arbitrage. Good regulators see their job as trying to keep these

risks prudent. They also recognize that the regulatory structure should not be such that no bank ever fails. If it were, banking as a creative force would be stifled.

INDUSTRIAL LOAN CORPORATIONS

The Bank Holding Act prohibits commercial firms from owing banks, a law meant to protect the banking system from drains on its resources that could develop if commercial firms wanted to owe banks in order to support their commercial operations. In addition, many see the potential for conflicts of interest, wherein commercial firms deny loans to competitors, although this argument is weakened by the significant number of options that borrowers have. For many years, scant forays into the banking realm have been made by commercial firms. There are, however, a number of prominent commercial firms that have finance wings. The standouts are in the automobile industry, where both General Motors and Ford Motor have nonbank financial units in the business of raising and lending funds.

Linkages between commercial firms and finance units are fairly common in the United States, but similar combinations between banks and commercial firms are prohibited. Nevertheless, in 1999 the Gramm-Leach-Bliley Act opened the door for commercial firms to break new ground in the banking industry. Specifically, the act provides a loophole for commercial firms to own *industrial loan corporations (ILCs)*, which are entities that provide a limited range of banking activities and are funded with FDIC-insured deposits. Data from the general accounting office indicate that at the end of 2004, there were 57 ILCs, holding about \$140 billion in assets, or roughly 3% of all insured deposits.³⁰ These banks generally do not offer checking accounts to businesses, but they are engaged in lending activities. Major firms such as Wal-Mart and Home Depot have sought ILCs of their own, making it clear that the ILC business is one that has a good deal of momentum.

BANK HOLDING COMPANIES

A bank holding company is any company that owns 10% or more of a bank. Almost all large banks and many smaller banks in the United States are owned by holding companies. Bank holding companies wishing to take advantage granted under Gramm-Leach-Bliley by affiliating with

³⁰ John R. Walter, "Mixing Banking and Commerce," Federal Reserve Bank of Richmond, *Region Focus*, Summer 2006.

TABLE 6.7

Financial characteristics of all reporting bank holding noted; not seasonally adjusted)

Account or Ratio^{1,2}	2000	2001	2002	2003	2004
<i>Balance sheet</i>					
Total assets	6,745,836	7,486,952	7,991,161	8,880,661	10,339,839
Loans	3,728,570	3,832,553	4,079,878	4,435,683	5,109,518
Securities and money market	2,197,434	2,568,704	2,867,137	3,302,401	3,804,003
Allowance for loan losses	-60,376	-68,833	-74,784	-73,817	-74,590
Other	880,209	1,154,529	1,118,931	1,216,395	1,500,909
Total liabilities	6,227,975	6,901,281	7,350,380	8,177,652	9,453,246
Deposits	3,771,749	4,025,769	4,357,245	4,705,043	5,249,488
Borrowings	1,991,564	2,073,770	2,244,492	2,630,242	3,158,539
Other ³	464,662	801,742	748,643	842,367	1,045,219
Total equity	517,861	585,671	640,781	703,009	886,593
<i>Off-balance sheet</i>					
Unused commitments to lend ⁴	3,297,511	3,481,745	3,650,669	4,097,531	4,823,334
Securitizations outstanding ⁵	n.a.	276,717	295,001	298,348	353,978
Derivatives (notional value, billions) ⁶	43,608	48,276	57,886	72,914	89,115
<i>Income statement</i>					
Net income⁷	73,168	66,510	85,732	107,939	114,290
Net interest income	197,695	224,470	246,048	257,537	280,623
Provisions for loan losses	27,604	40,661	45,086	33,052	28,606
Noninterest income	200,872	218,984	221,516	250,608	271,465
Noninterest expense	258,213	302,141	296,966	316,338	357,711
MEMO					
Realized security gains or losses	-605	4,338	4,598	5,771	5,491
<i>Ratios (percent)</i>					
Return on average equity	15.19	11.86	14.11	16.28	14.39
Return on average assets	1.13	.91	1.11	1.26	1.17
Net interest margin ⁸	3.58	3.61	3.74	3.51	3.38

companies in the United States (millions of dollars except as

<i>2004</i>				<i>2005</i>		
Q1	Q2	Q3	Q4	Q1	Q2	Q3
9,357,969	9,711,531	9,959,685	10,339,839	10,710,584	10,956,178	11,237,913
4,614,913	4,802,958	4,948,873	5,109,518	5,185,007	5,355,072	5,506,691
3,542,305	3,580,333	3,628,275	3,804,003	4,064,697	4,099,618	4,240,534
-76,744	-76,533	-76,045	-74,590	-73,385	-72,954	-73,949
1,277,496	1,404,772	1,458,582	1,500,909	1,534,264	1,574,443	1,564,638
8,613,886	8,938,465	9,107,754	9,453,246	9,820,040	10,035,265	10,310,107
4,847,908	5,005,099	5,064,670	5,249,488	5,349,230	5,447,870	5,551,289
2,903,088	2,956,549	3,055,319	3,158,539	3,423,243	3,525,387	3,663,114
862,891	976,816	987,765	1,045,219	1,047,567	1,062,008	1,095,704
744,083	773,066	851,931	886,593	890,544	920,913	927,806
4,354,895	4,426,497	4,574,267	4,823,334	4,910,034	5,040,259	5,245,823
308,543	314,258	313,436	353,978	366,430	367,639	374,909
79,273	83,109	84,723	89,115	92,623	96,658	98,275
30,721	25,866	30,160	28,853	32,909	32,707	34,702
67,630	71,451	72,038	71,675	72,817	73,179	74,533
7,165	6,994	7,383	7,793	6,577	6,823	9,929
67,222	73,714	66,986	67,661	73,221	72,266	77,490
82,984	101,029	87,213	90,009	91,256	91,684	93,898
1,978	1,011	2,001	480	417	1,478	471
17.07	13.50	14.55	13.37	14.86	14.58	15.14
1.33	1.07	1.22	1.12	1.24	1.20	1.25
3.43	3.48	3.44	3.29	3.18	3.09	3.06

Continued

TABLE 6.7—cont'd

Financial characteristics of all reporting bank holding noted; not seasonally adjusted)

Account or Ratio^{1,2}	2000	2001	2002	2003	2004
Efficiency ratio ⁷	63.95	66.94	62.41	61.76	63.45
Nonperforming assets to loans and related assets	1.09	1.44	1.44	1.15	.82
Net charge-offs to average loans	.64	.89	1.04	.84	.67
Loans to deposits	98.86	96.20	93.63	94.28	97.33
<i>Regulatory capital ratios</i>					
Tier 1 risk-based	8.84	8.92	9.22	9.58	9.37
Total risk-based	11.80	11.92	12.28	12.60	12.25
Leverage	6.81	6.68	6.72	6.87	6.61
Number of reporting bank holding companies	1,727	1,842	1,979	2,134	2,254

¹ Covers top-tier bank holding companies except (a) those with consolidated assets of less than \$150 million and with only one subsidiary bank and (b) multibank holding companies with consolidated assets of less than \$150 million, with no debt outstanding to the general public and not engaged in certain nonbanking activities.

² Data for all reporting bank holding companies and the 50 large bank holding companies reflect merger adjustments to the 50 large bank holding companies. Merger adjustments account for mergers, acquisitions, other business combinations, and large divestitures that occurred during the time period covered in the table so that the historical information on each of the 50 underlying institutions depicts, to the greatest extent possible, the institutions as they exist in the most recent period. In general, adjustments for mergers among bank holding companies reflect the combination of historical data from predecessor bank holding companies. The data for the 50 large bank holding companies have also been adjusted as necessary to match the historical figures in each company's most recently available financial statement. In general, the data are not adjusted for changes in generally accepted accounting principles.

³ Includes minority interests in consolidated subsidiaries.

⁴ Includes credit card lines of credit as well as commercial lines of credit.

other financial institutions must declare that they wish to be financial holding companies first. So, the route to become a supermarket for financial services such as banking, securities, and insurance is through a bank holding company. Table 6.7 provides a glimpse of the financial conditions of bank holding companies in the United States.

The root of today's regulatory environment for bank holding companies was formed decades ago. Prior to the 1960s, bank holding companies were used primarily to surmount restrictions on intrastate branching by bringing under a single organization a number of separately chartered banks.

companies in the United States (millions of dollars except as

<i>2004</i>				<i>2005</i>		
Q1	Q2	Q3	Q4	Q1	Q2	Q3
61.36	67.09	62.34	64.35	60.47	61.40	61.69
1.09	.96	.89	.82	.76	.71	.70
.72	.66	.60	.71	.57	.52	.65
95.19	95.96	97.71	97.33	96.93	98.30	99.20
9.54	9.39	9.34	9.37	9.31	9.30	9.16
12.45	12.25	12.17	12.25	12.18	12.06	11.90
6.87	6.67	6.72	6.61	6.51	6.54	6.53
2,193	2,211	2,240	2,254	2,282	2,296	2,288

⁵ Includes loans sold to securitization vehicles in which bank holding companies retain some interest, whether through recourse or seller-provided credit enhancements or by servicing the underlying assets. Securitization data were first collected on the FR Y-9C report for June 2001.

⁶ The notional value of a derivative is the reference amount of an asset on which an interest rate or price differential is calculated. The total notional value of a bank holding company's derivatives holdings is the sum of the notional values of each derivative contract regardless of whether the bank holding company is a payor or recipient of payments under the contract. The actual cash flows and fair market values associated with these derivative contracts are generally only a small fraction of the contract's notional value.

⁷ Income statement subtotals for all reporting bank holding companies and the 50 large bank holding companies exclude extraordinary items, the cumulative effects of changes in accounting principles, and discontinued operations at the 50 large institutions and therefore will not sum to net income. The efficiency ratio is calculated excluding nonrecurring income and expenses.

⁸ Calculated on a fully taxable-equivalent basis.

Source: Federal Reserve Bulletin, 2006

Formation of multibank holding companies was brought under regulation by the Bank Holding Company Act in 1956. The purpose of this act, administered by the Federal Reserve Board, was twofold: to prevent the creation of monopoly power in banks and to prevent banks from entering via their holding company what were traditionally nonbank lines of activity.

In the late 1960s, many of the nation's largest banks formed one-bank holding companies, which were not subject to the provisions of the 1956 Act. One objective in doing so was to create a vehicle through which

they could enter indirectly activities they could not carry out directly. The banks' ability to achieve such diversification was, however, severely limited by the Bank Holding Company Act of 1970. This act brought one-bank holding companies under regulation by the Federal Reserve Board, which is responsible for restricting their activities to those "which are so closely related to banking as to be a proper incident thereto."

With the repeal of Glass-Steagall and the restrictions associated with the Bank Holding Company Act regarding affiliations, today the focus on bank holding companies will be primarily on those that become financial holding companies and the many changes they bring to the financial world.

REVIEW IN BRIEF

- Today, bankers are playing a broader role in the economy, with the line between banking and other parts of the financial sector having become blurred, as evidenced in part by the fall of *Glass-Steagall* in 1999.
- Moreover, the widespread growth of branching that followed the *Riegle-Neal Banking and Branch Efficiency Act of 1994* has made the local bank more ubiquitous than ever.
- The nation's largest banks, true giants, are often referred to as *money market* or *money center banks*. Activity in every sector of the money market is strongly influenced and in some cases dominated by these institutions.
- One of the most important developments that has occurred in the banking industry in recent years has been its consolidation.
- Greater concentration of industry assets should not be mistaken for greater risk, as most banks today are well capitalized.
- To finance its operations, a money market bank draws funds from various sources, beginning with stable balances such as savings and transactions balances. These are not enough to finance the industry's assets, so it turns to borrowings, particularly overnight money such as fed funds and Eurodollars. Indeed, at the end of September 2006, of the roughly \$9.3 trillion in assets held by U.S. commercial banks, roughly \$1.8 trillion of these assets were financed through borrowings.

- Banks have had to evolve and change their strategies for maintaining profitability, apparently doing so very successfully, judging by trends in profitability in recent years.
- Many money market banks act as dealers in government and other exempt securities.
- The notional principal value of derivatives held by all banks was \$102 trillion at the end of 2005, a figure that is to some extent misleading given that the fair market value was just \$16 billion and in light of the fact that dealers invariably hold long and short positions in their role as dealer.
- In recent years, a significant increase in competition in the banking industry has put downward pressure on *net interest margin*.
- Gone are the days when bankers operated on the so-called *3-6-3 rule*, when bankers accepted deposits at 3%, lent the money at 6%, and were on the golf course at three o'clock!
- Basel I has become outmoded, and a new capital adequacy framework for *Basel II*, also known as *Basel IA*, has been under negotiation since 1999 for adoption at the end of 2007. The fundamental objective of the Basel Committee's work to revise Basel I is to develop a framework that would further strengthen the soundness and stability of the international banking system while maintaining sufficient consistency that capital adequacy regulation will not be a source of competitive inequality among internationally active banks.
- A major development in the United States and worldwide has been the breakdown of barriers of all kinds both around and within national capital markets. The advent of the euro in 1999 has had a major impact on the globalization of debt markets.
- Deregulation and globalization have created opportunities for banks to pursue many new businesses, and they are doing so. Four major areas of banking include lending activities, corporate finance, trading, and distribution of securities and derivatives.
- Gramm-Leach-Bliley amended the Bank Holding Company Act by providing for the creation of financial holding companies, which are bank holding companies that may engage in any activity or hold the shares of any company that engages in any

activity that the Federal Reserve Board has determined is financial in nature.

- The Gramm-Leach-Bliley Act contains numerous provisions that will allow banks, securities firms, and insurance companies to affiliate with one another.
- Before Gramm-Leach-Bliley, banks engaged in investment banking activities as Section-20 affiliates, so-called because they were formed in accordance with Section 20 of the Glass-Steagall Act, which prohibited banks from affiliating with other financial institutions that were “engaged principally in the issue, floatation, underwriting, public sale or distribution of financial assets.” By the time Gramm-Leach-Bliley was enacted in 1999, there were already 45 Section-20 banks.
- Five years after Gramm-Leach-Bliley, the investment banking activities in the nation’s banks had increased, although perhaps not by as much as some expected.
- The business we call domestic treasury has historically been twofold: to fund loans and whatever other assets the bank acquired and to manage the bank’s interest-rate gap based on the bank’s view on interest rates.
- In recent years, the low interest-rate and tight credit spread environment that has prevailed has led to a “yield grab” across the fixed-income market, including the banking industry. As a result, the data show that there has been a seismic shift in the types of securities that banks were willing to own, particularly in the early 2000s.
- Today, banks are obtaining funding for their growing assets in traditional ways, chiefly through deposits and short-term borrowings, as well as through managed liabilities such as overnight borrowings.
- By the end of 2005, savings deposits (including money market demand accounts) represented a significant portion of bank liabilities and a sharp increase from a decade earlier. The preference for holding savings deposits has shown strong correlation to the level of short-term interest rates.
- Banking in America is often referred to as a “dual” system because some banks operate under federal charters obtained from the Office of the Comptroller of the Currency (OCC),

while others are chartered by the states. There are several advantages and disadvantages to this system.

- The Bank Holding Act prohibits commercial firms from owning banks, but loopholes in recent banking legislation have led to the growth of *industrial loan corporations (ILC)*, entities owned by commercial firms that engage in limited amounts of banking activity. Major firms such as Wal-Mart and Home Depot have sought ILCs of their own, making it clear that the ILC business is one that has a good deal of momentum.

APPENDIX TO CHAPTER 6

The Banking Acts That Matter***EDGE ACT: 1919**

Named after Senator Walter Edge of New Jersey, who played a prominent role in its passage, the Edge Act provided for federal chartering of corporations that were formed to engage solely in foreign banking. The hope was that these Edge Act corporations would play a key role in financing American exports.

McFADDEN ACT: 1927

This prohibits interstate banking.

GLASS-STEAGALL ACT: 1933

This severed commercial from investment banking and forced banks to divest themselves of any security-trading affiliates. The 1933 Banking Act also created the Federal Deposit Insurance Corporation (FDIC) and brought bank holding companies—except, as was discovered later, the one-bank holding companies—under the supervision of the Federal Reserve Board.

DOUGLAS AMENDMENT TO THE BANK HOLDING COMPANY ACT: 1956

This prohibits a bank holding company headquartered in one state from acquiring a bank in another state unless the second state specifically permits the acquisition.

BANK MERGER ACT: 1960

After a decade of debate over whether to apply existing antitrust laws explicitly to banking or to incorporate similar competitive standards into

*From "A Survey of International Banking," *The Economist*, March 14, 1981.

existing banking laws, this legislation plumped for the second source. It required the bank regulatory agencies (for the first time) to weigh the possible competitive effects of proposed mergers and acquisitions when considering applications.

AMENDMENT TO THE BANK HOLDING COMPANY ACT: 1970

This brought one-bank holding companies under the same regulations as multibank holding companies.

INTERNATIONAL BANKING ACT: 1978

To bring foreign banks within the federal regulatory framework, the International Banking Act introduced six major statutory changes:

1. It limited interstate domestic deposit taking by foreign banks. Previously, foreign banks had been free to open full-service branches wherever state law permitted. The new law required each foreign bank to elect a “home state” and restricted domestic deposit taking by offices outside that state. Existing multistate branch networks of foreign banks were “grandfathered” (allowed to carry on as they were), a major concession since 40 of the 50 largest foreign banks were able to shelter under its wing.
2. It provided the option of federal licensing for foreign bank agencies and branches. Previously all foreign bank offices had state licenses, and some states applied reciprocity rules which effectively barred banks from certain countries. The federal licensing authority (the Office of the Comptroller of the Currency) has permitted foreign banks to establish offices without regard to whether the foreign bank’s home country grants equivalent access to American banks.
3. It authorized the Federal Reserve Board to impose reserve requirements on agencies and branches of foreign banks with worldwide assets of more than \$1 billion and to limit the maximum rates of interest such offices could pay on time deposits to the same as member banks.

4. It required federal deposit insurance (not previously available to foreign banks) for those branches engaged in retail deposit taking.
5. It amended the Edge Act to permit Edge corporations (which could conduct international banking out of state) to compete over a broader range of businesses and permitted foreign banks to set up such corporations.
6. It subjected foreign banks to the same prohibitions on nonbanking business as those imposed on domestic bank holding companies. Once again, existing nonbanking activities (including securities underwriting from which domestic banks are excluded) were “grandfathered.”

DEPOSITORY INSTITUTIONS DEREGULATION AND MONETARY CONTROL ACT: 1980

This “omnibus act” had four main aims:

1. To phase out (over a six-year period) interest-rate ceilings on deposits and to eliminate the 0.25% favorable differential traditionally enjoyed by the thrifts. A depository institutions deregulation committee (DIDC), with representatives from the main regulatory agencies, was set up to oversee the process. All the evidence pointed at that time to the committee accomplishing its task in far less than six years.
2. To extend nationwide the authority (previously exclusive to the New England states) to offer NOW (negotiable order of withdrawal) accounts. The maximum rate to be offered on NOW accounts was set initially at 5.25% for all institutions. This ended the prohibition on the payment of interest on demand deposits.
3. To grant new powers to the federally chartered thrifts. A number of states passed parallel legislation for state-chartered institutions to discourage desertion from state to federal charter. Most importantly, these powers permitted S&Ls to invest up to 20% of their assets in consumer loans, commercial paper, and company securities; to offer credit cards; and to exercise fiduciary powers.

4. To override state-imposed usury ceilings on mortgages. (Some states had already taken action to raise their ceilings.)

DEPOSITORY INSTITUTIONS ACT: 1982[†]

This act was designed to aid failing thrifts and to permit both banks and thrifts to compete immediately for deposits with money funds.

To accomplish the first aim, the act created a scheme under which thrifts whose net worth dropped to below 3% of their assets could prop up their net worth by swapping paper they issue for promissory notes—to be counted as capital—from the Federal Savings and Loan Insurance Corporation, which insures deposits at S&Ls up to \$100,000. For thrifts too sick to survive even with such aid, the act specifically permits takeovers by an out-of-state thrift or even a bank. The act also gave thrifts the new right to make commercial loans of up to 10% of their total assets and to accept deposits from firms as well as individuals.

To help banks and thrifts compete with money funds, the new act required the depository institutions deregulation committee to establish a new account that carried *no* interest rate controls and *no* withdrawal penalties and that permitted a depositor with such an account to make each month three preauthorized transfers from it and to write three checks on it. The new account, whether at a bank or thrift, was to resemble a money-fund account but have the added attraction to depositors of carrying FDIC or FSLIC insurance on deposits of up to \$100,000. The DIDC responded to this congressional mandate by crediting first the *money market deposit account (MMDA)* (December 1982) and then the *Super-NOW account* (January 1983).

The law also required that all interest-rate controls on bank accounts as well as the $\frac{1}{4}\%$ advantage S&Ls enjoyed over banks on the rates they could pay on time deposits be phased out by January 1984, two years earlier than scheduled in the 1980 Banking Act.

Finally, the act raised from 10% to 15% of capital and surplus the amount that nationally chartered banks could lend to any one borrower. Legal lending limits for state-chartered banks generally equal or exceed those for nationally chartered banks.

[†]Marcia Stigum, *The Money Market*, 3rd ed. (Homewood, Ill.: Business One Irwin, 1990).

COMPETITIVE EQUALITY BANKING ACT OF 1987 (P.L. 100-86, 101 STAT. 552)*

Also known as CEBA, it established new standards for expedited funds availability, recapitalized the Federal Savings & Loan Insurance Corporation (FSLIC), and expanded FDIC authority for open bank assistance transactions, including bridge banks.

FINANCIAL INSTITUTIONS REFORM, RECOVERY, AND ENFORCEMENT ACT OF 1989 (P.L. 101-73, 103 STAT. 183)

This act is also known as FIRREA. FIRREA's purpose was to restore the public's confidence in the savings and loan industry. FIRREA abolished the Federal Savings & Loan Insurance Corporation (FSLIC), and the FDIC was given the responsibility of insuring the deposits of thrift institutions in its place.

The FDIC insurance fund created to cover thrifts was named the Savings Association Insurance Fund (SAIF), while the fund covering banks was called the Bank Insurance Fund (BIF).

FIRREA also abolished the Federal Home Loan Bank Board. Two new agencies, the Federal Housing Finance Board (FHFB) and the Office of Thrift Supervision (OTS), were created to replace it.

Finally, FIRREA created the Resolution Trust Corporation (RTC) as a temporary agency of the government. The RTC was given the responsibility of managing and disposing of the assets of failed institutions. An oversight board was created to provide supervisory authority over the policies of the RTC, and the Resolution Funding Corporation (RFC) was created to provide funding for RTC operations.

CRIME CONTROL ACT OF 1990 (P.L. 101-647, 104 STAT. 4789)

Title XXV of the Crime Control Act, known as the Comprehensive Thrift and Bank Fraud Prosecution and Taxpayer Recovery Act of 1990,

*Content for this section through the section "Gramm-Leach-Bliley Act of 1999" is taken from the Federal Deposit Insurance Company's Web site in a section titled "Important Banking Legislation," which can be found at www.fdic.gov/regulations/laws/important/index.html. The text of these acts is available from the Library of Congress Thomas Web site at thomas.loc.gov. Under "Legislation," select "Public Laws," and then select the number of the Congress and find the law by the P.L. number.

greatly expanded the authority of federal regulators to combat financial fraud.

This act prohibited undercapitalized banks from making golden parachute and other indemnification payments to institution-affiliated parties. It also increased penalties and prison time for those convicted of bank crimes, increased the powers and authority of the FDIC to take enforcement actions against institutions operating in an unsafe or unsound manner, and gave regulators new procedural powers to recover assets improperly diverted from financial institutions.

FEDERAL DEPOSIT INSURANCE CORPORATION IMPROVEMENT ACT OF 1991 (P.L. 102-242, 105 STAT. 2236)

Also known as FDICIA, this act greatly increased the powers and authority of the FDIC. Major provisions recapitalized the Bank Insurance Fund and allowed the FDIC to strengthen the fund by borrowing from the Treasury.

The act mandated a least-cost resolution method and prompt resolution approach to problem and failing banks and ordered the creation of a risk-based deposit insurance assessment scheme. Brokered deposits and the solicitation of deposits were restricted, as were the nonbank activities of insured state banks. FDICIA created new supervisory and regulatory examination standards and put forth new capital requirements for banks. It also expanded prohibitions against insider activities and created new truth in savings provisions.

HOUSING AND COMMUNITY DEVELOPMENT ACT OF 1992 (P.L. 102-550, 106 STAT. 3672)

This act established regulatory structure for government-sponsored enterprises (GSEs), combated money laundering, and provided regulatory relief to financial institutions.

RTC COMPLETION ACT (P.L. 103-204, 107 STAT. 2369)

This act requires the RTC to adopt a series of management reforms and to implement provisions designed to improve the agency's record in providing

business opportunities to minorities and women when issuing RTC contracts or selling assets. It expands the existing affordable housing programs of the RTC and the FDIC by broadening the potential affordable housing stock of the two agencies.

It increases the statute of limitations on RTC civil lawsuits from three years to five, or to the period provided in state law, whichever is longer. In cases in which the statute of limitations has expired, claims can be revived for fraud and intentional misconduct resulting in unjust enrichment or substantial loss to the thrift. It provides final funding for the RTC and establishes a transition plan for transfer of RTC resources to the FDIC. The RTC's sunset date was set at December 31, 1995, at which time the FDIC assumed its conservatorship and receivership functions.

RIEGLE COMMUNITY DEVELOPMENT AND REGULATORY IMPROVEMENT ACT OF 1994 (P.L. 103-325, 108 STAT. 2160)

This act established a Community Development Financial Institutions Fund, a wholly owned government corporation that would provide financial and technical assistance to CDFIs.

It contains several provisions aimed at curbing the practice of "reverse redlining" in which nonbank lenders target low and moderate income homeowners, minorities, and the elderly for home equity loans on abusive terms. It relaxes capital requirements and other regulations to encourage the private sector secondary market for small business loans.

It contains more than 50 provisions to reduce bank regulatory burden and paperwork requirements and requires the Treasury Department to develop ways to substantially reduce the number of currency transactions filed by financial institutions. It contains provisions aimed at shoring up the National Flood Insurance Program.

RIEGLE-NEAL INTERSTATE BANKING AND BRANCHING EFFICIENCY ACT OF 1994 (P.L. 103-328, 108 STAT. 2338)

This act permitted adequately capitalized and managed bank holding companies to acquire banks in any state one year after enactment. Concentration limits apply and CRA evaluations by the Federal Reserve are required before acquisitions are approved. Beginning June 1, 1997,

interstate mergers were allowed between adequately capitalized and managed banks, subject to concentration limits, state laws, and CRA evaluations. It extends the statute of limitations to permit the FDIC and RTC to revive lawsuits that had expired under state statutes of limitations.

ECONOMIC GROWTH AND REGULATORY PAPERWORK REDUCTION ACT OF 1996 (P.L. 104-208, 110 STAT. 3009)

This act modified financial institution regulations, including regulations impeding the flow of credit from lending institutions to businesses and consumers. It amended the Truth in Lending Act and the Real Estate Settlement Procedures Act of 1974 to streamline the mortgage lending process.

It amended the FDIA to eliminate or revise various application, notice, and record-keeping requirements to reduce regulatory burden and the cost of credit. It amended the Fair Credit Reporting Act to strengthen consumer protections relating to credit reporting agency practices.

It established consumer protections for potential clients of consumer repair services. It clarified lender liability and federal agency liability issues under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), commonly known as Superfund. It directed the FDIC to impose a special assessment on depository institutions to recapitalize the SAIF and aligned SAIF assessment rates.

GRAMM-LEACH-BLILEY ACT OF 1999 (P.L. 106-102, 113 STAT 1338)

This act repeals the last vestiges of the Glass-Steagall Act of 1933. It modifies portions of the Bank Holding Company Act to allow affiliations between banks and insurance underwriters. While preserving authority of states to regulate insurance, the act prohibits state actions that have the effect of preventing bank-affiliated firms from selling insurance on an equal basis with other insurance agents. The law creates a new financial holding company under section 4 of the BHCA, authorized to engage in: underwriting and selling insurance and securities, conducting both commercial and merchant banking, investing in and developing real estate and other “complimentary activities.” There are limits on the kinds of nonfinancial activities these new entities may engage in.

The act allows national banks to underwrite municipal bonds.

It restricts the disclosure of nonpublic customer information by financial institutions. All financial institutions must provide customers with the opportunity to “opt out” of the sharing of the customers’ nonpublic information with unaffiliated third parties. The act imposes criminal penalties on anyone who obtains customer information from a financial institution under false pretenses.

It amends the Community Reinvestment Act to require that financial holding companies cannot be formed before their insured depository institutions receive and maintain a satisfactory CRA rating. It also requires public disclosure of bank-community CRA-related agreements. It grants some regulatory relief to small institutions in the shape of reducing the frequency of their CRA examinations if they have received outstanding or satisfactory ratings. It prohibits affiliations and acquisitions between commercial firms and unitary thrift institutions.

The act makes significant changes in the operation of the Federal Home Loan Bank System, easing membership requirements and loosening restrictions on the use of FHLB funds.

INTERNATIONAL MONEY LAUNDERING ABATEMENT AND FINANCIAL ANTI-TERRORISM ACT OF 2001 (P.L. 107-56)[§]

This legislation is designed to prevent terrorists and others from using the U.S. financial system anonymously to move funds obtained from or destined for illegal activity. It authorizes and requires additional record keeping and reporting by financial institutions and greater scrutiny of accounts held for foreign banks and of private banking conducted for foreign persons.

The law requires financial institutions to establish anti-money-laundering programs and imposes various standards on money-transmitting businesses. It amends criminal anti-money-laundering statutes and procedures for forfeitures in money-laundering cases and requires further cooperation between financial institutions and government agencies in fighting money laundering.

[§]From this section on, descriptions are taken from “Major Statutes Affecting Financial Institutions and Markets,” Congressional Research Service, July 7, 2004. The text of these acts is available from the Library of Congress Thomas Web site at thomas.loc.gov. Under “Legislation,” select “Public Laws,” and then select the number of the Congress and find the law by the P.L. number.

SARBANES-OXLEY ACT OF 2002 (P.L. 107-204)

Sarbanes-Oxley establishes the Public Company Oversight Board to regulate public accounting firms that audit publicly traded companies. It prohibits such firms from providing other services to such companies along with the audit. It requires that CEOs and CFOs certify the annual and quarterly reports of publicly traded companies. The act authorizes, and in some cases requires, that the Securities and Exchange Commission (SEC) issue rules governing audits.

The law requires that insiders may no longer trade their company's securities during pension fund blackout periods. It mandates various studies including a study of the involvement of investment banks and financial advisors in the scandals preceding the legislation. Also included are whistleblower protections, new federal criminal laws, including a ban on alteration of documents.

FAIR AND ACCURATE CREDIT TRANSACTIONS ACT OF 2003 (P.L. 108-159)

The Fair and Accurate Credit Transactions (FACT) Act contains extensive amendments to the Fair Credit Reporting Act and is designed to improve the accuracy and transparency of the national credit reporting system, prevent identity theft, and assist victims. It contains provisions enhancing consumer rights in situations involving alleged identity theft, credit scoring, and claims of inaccurate information. It requires use of consumer reports to provide certain information to consumers who are offered credit on terms that are materially less favorable than the offers that the creditor makes to a substantial portion of its consumers. Companies that share consumer information among affiliated companies must provide consumers notice and an opt out for sharing of such information if the information will be used for marketing purposes.

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The Banks: Eurodollar Operations

One of the fastest-growing as well as the most vital and important capitalist institutions has been the international capital market known as the *Eurodollar market*. In the United States, much focus tends to be on the fed funds rate, the interest rate controlled by the Fed and the benchmark interest rate upon which all U.S. rates are set. Overlooked is the fact that today banks obtain more of their funding from the Eurodollar market than from the fed funds market. The Eurodollar market is today being augmented by “Euro” markets of all sorts and in many currencies, particularly since the advent of Europe’s currency, the euro, in 1999. Behind this continued growth is the globalization of financial systems, which has been wrought by a surge in international trade, the growth of capitalism in Eastern Europe and in Asia, as well as international efforts to harmonize banking standards worldwide.

EURODOLLAR TRANSACTIONS IN T-ACCOUNTS

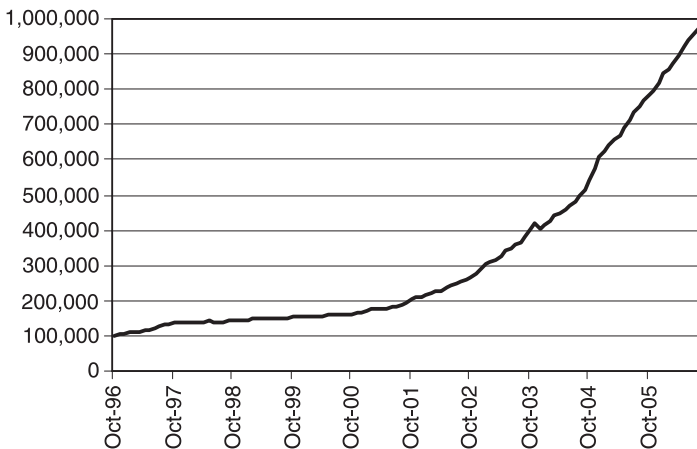
The best way to start a discussion of the Eurodollar market is by explaining the mechanics of Eurodollar deposits and loans, about which there is much confusion, especially because of the European euro (in this chapter, references to the European euro are denoted with a lowercase “e” and any references to “Euro” will denote a reference to foreign currencies deposited outside of a particular country, generally dollars). First, a definition: *Eurodollars are simply dollars held on deposit in a bank or bank branch*

located outside the United States or in an international banking facility (IBF).¹ If a U.S. investor shifts \$1 million of deposits from a New York bank to the London branch of a U.S. bank, to Barclays London, or to the London branch of any French, German, or other foreign bank and receives in exchange a deposit denominated in dollars, he has made a *Eurodollar deposit*. Such deposits came to be known as Eurodollars because initially banks in Europe were most active in seeking and accepting such deposits.

Today, however, banks all over the globe are active in the Eurodollar market, and the term *Eurodollar* is a misnomer. Nowhere is this more evident than in Asia, where in 2006 China was the largest holder of dollars outside of the United States, holding reserves of nearly \$1 trillion (Figure 7.1). In addition, Japan was the world's biggest holder of U.S. Treasuries, holding \$636.6 billion at the end of July 2006, about twice as much as the world's next largest holder, China. The widespread proliferation of dollars that has occurred over the past 15 years is abundantly evident in countries that once were loath to hold dollars. Russia is the standout in this regard, having boosted its holdings of dollars significantly thanks to a

FIGURE 7.1

China's foreign-exchange reserves have grown substantially, reaching nearly \$1 trillion by the middle of 2006 (in millions of dollars)



Source: China's National Bureau of Statistics

¹ International banking facilities (IBFs) are described toward the end of this chapter.

surge in oil-related revenues. At the end of September 2006, Russia’s reserves had swelled to \$266 billion compared to just \$10 billion in 1998 when Russia defaulted on its debts (Figure 7.2).

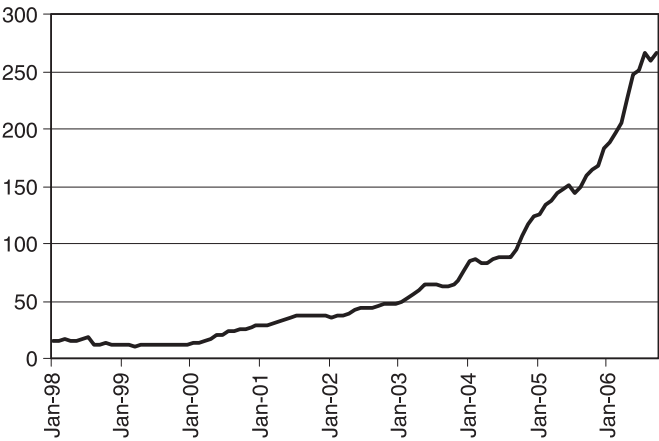
The first important point to make about Eurodollars is that regardless of where they are deposited—London, Singapore, Tokyo, or Brazil—they never leave the United States. Also, they never leave the United States regardless of where they are lent—to a multinational firm, to an underdeveloped country, or to an Eastern European government. Let’s work that out with T-accounts. As noted in Chapter 2, a T-account shows *changes in assets and liabilities* that result from a given financial transaction, as shown below.

T-Account	
Changes in Assets	Changes in Liabilities

To get our example going, suppose Exxon Mobil moves \$10 million from its account at JPMorgan Chase in New York to the London branch of Citibank. Clearing of this transaction will result in several balance sheet changes (Table 7.1).

FIGURE 7.2

Russia's international reserves have increased sharply as a result of increases in energy prices (in billions of dollars)



Source: The Bank of Russia

TABLE 7.1

A Eurodollar deposit is made and cleared

Exxon Mobil			
Demand deposits, Morgan N.Y -10MM (Eurodollar) time deposits, Citi London +10MM			
Citibank New York		Citibank London	
Reserves +10MM	London office dollar account (a "due to" item, Citi N.Y. to Citi London) +10MM	New York office dollar account (a "due from" item, Citi London to Citi N.Y.) +10MM	(Eurodollar) time deposits +10MM
JPMorgan Chase New York		New York Fed	
Reserves -10MM	Demand deposits, Exxon -10MM		Reserves, Morgan -10MM Reserves, Citi +10MM

Note: MM represents millions.

Before we look at these changes, two preliminary remarks are in order. First, Citibank’s London branch is an integral part of Citibank; and when the bank publishes statements, it consolidates the assets and liabilities of its head office and all foreign branches. However, on a day-to-day operating basis, Citibank New York, Citibank London, and Citibank’s other foreign branches all keep separate books. Second, Citibank has just one account at the Fed, which is held by Citibank New York, the head office.

Now let’s look at Table 7.1. It shows that, as a result of the transaction, Exxon Mobil exchanges one asset, \$10 million of demand deposits at JPMorgan Chase New York, for another, \$10 million of the Eurodollar deposits at Citibank London. To make this exchange, Exxon withdrew funds from Morgan and deposited them at Citi. This means, of course, that

when the transaction clears, Morgan must pay Citi the funds Exxon has transferred from one bank to the other. Morgan does this in effect by transferring money from its reserve account at the Fed to Citi's reserve account at the Fed. Thus, the transaction causes Morgan to lose reserves and Citi New York to gain them. At Morgan, the loss of reserves is offset by a decrease in deposit liabilities.

At Citi, the situation is more complicated, as Table 7.1 shows. Citi London has received the deposit, but Citi New York has received the extra reserves. So Citi New York in effect owes Citi London money. This is accounted for by adjusting the *New York office dollar account*, which can be thought of simply as a checking account that Citi London holds with Citi New York. To Citi London, as long as this account is in surplus, which it normally would be, the account is a *due from* item that shows up on Citi London's balance sheet as an asset. On Citi New York's balance sheet, the same account is a *due to* item that consequently shows up on Citi New York's balance sheet as any other deposit would. With this in mind, it's easy to follow what happens on Citi's books as a result of Exxon's deposit. Citi London gets a new \$10 million liability in the form of a time deposit, which is offset by an equal credit to its account with the home office. Meanwhile, the home office gets \$10 million of extra reserves, which are offset by a like increase in its liability at its London branch.

Note several things about this example. First, the changes that occurred on every institution's balance sheet were offsetting; that is, net worth never changes. This is *always* the case in any transaction, the consequences of which can be illustrated with T-accounts.

A second and more important point is that while Exxon now thinks of itself as holding dollars in London, the dollars actually never left the United States. The whole transaction simply caused \$10 million of reserves to be moved from Morgan's reserve account at the New York Fed to Citi's account there (see Table 7.1). This, by the way, would have been the case in any Eurodollar deposit example we might have used. Regardless of who makes the deposit, who receives it, and where in the world it is made, the ultimate dollars never leave the United States.

A EURODOLLAR LOAN

In our example, we left Citibank London with a new time deposit on which it must pay interest. To profit from that deposit, Citibank London is naturally going to lend out those dollars. Suppose that Citibank London

TABLE 7.2

A Eurodollar loan is granted to Electricite de France (EDF)

Citibank London		EDF	
Loan, EDF +10MM	(Eurodollar) deposits EDF +10MM	(Eurodollar) deposits, Citi London +10MM	Loan, Citi London +10MM

Note: MM represents millions.

lends the dollars to Electricite de France (EDF). Initially, this loan results in EDF's being credited with an extra \$10 million in deposits at Citibank London, as Table 7.2 shows. EDF of course has borrowed the money, so the \$10 million will not sit idly in its account.

Assume that EDF uses the dollars it has borrowed to pay for oil purchased from a Russian seller who banks at Bank of America London. Table 7.3, which should be self-explanatory to anyone who followed Table 7.1, shows the balance sheet changes that will result from this transaction. Note that when EDF pulls \$10 million out of Citibank London, Citibank London, since it has no real dollars other than a deposit balance with Citibank New York, must in effect ask Citibank New York to pay out this money with dollars that Citibank New York has in its reserve account at the Fed. As this is done, offsetting changes occur in the New York and London offices dollar accounts at Citibank. Meanwhile opposite but similar changes occur on the books of Bank of America London and Bank of America New York.

It is important to note that in this Eurodollar loan transaction, just as in the Eurodollar deposit transaction we worked through above, the dollars never leave New York. The transaction simply results in a movement of \$10 million from the reserve account at the New York Fed of Citibank to that of Bank of America. One might argue that we have not yet gone far enough—that the Russian oil seller will spend the dollars it has received and that the money might then leave the United States. But that's not so. Whoever gets the dollars the Russian entity spends must deposit them somewhere, and thus the spending by the Russian entity of its dollars will simply shift them from one bank's reserve account to another's. In this respect, it might be useful to recall

TABLE 7.3

Electricite de France (EDF) uses its borrowed dollars to pay for oil

EDF		Russian Oil Seller	
(Eurodollar) deposits −10MM	Accounts payable −10MM	Accounts receivable −10MM (Eurodollar) deposits, Bank of America London +10MM	
Citibank London		Bank of America London	
New York office dollar account −10MM	(Eurodollar) deposits, EDF −10MM	New York office dollar account +10MM	Time deposits, Russian oil seller +10MM
Citibank New York		Bank of America New York	
Reserves −10MM	London office dollar account −10MM	Reserves +10MM	London office dollar account +10MM
New York Fed			
		Reserves, Citibank −10MM	
		Reserves, Bank of America +10MM	

Note: MM represents millions.

a point made in Chapter 2. The only way reserves at the Fed can be increased or decreased in the aggregate is through open market operations initiated by the Fed itself. The one exception is withdrawals of cash from the banking system. If the Russian oil seller were to withdraw \$10 million in cash from Bank of America London and lock it up in a safe there or elsewhere, the dollars would have actually left the United States. However, no big depositor would do that because of opportunity cost: Eurodollar deposits yield interest; cash in a vault would not.

A EURODOLLAR PLACEMENT WITH A FOREIGN BANK

In the Eurodollar market, banks routinely lend dollars to other banks by making deposits with them and borrow dollars from other banks by taking deposits from them. Participants in the Eurodollar market with international experience sometimes refer to the depositing of Eurodollars with another bank as a *placement* of funds and to the receipt of Eurodollar deposits from another bank as a *taking* of funds. Other people in the U.S. money market are likely to use the jargon of the fed funds market, referring to placement of Eurodollars as *sales* of funds and to taking of Eurodollars as *purchases* of funds.

To illustrate what happens when a foreign bank ends up holding a Eurodollar deposit, let's work through the mechanics of a placement of Eurodollars with such a bank. Assume that Bank of America London places a \$20 million deposit in the London branch of Crédit Lyonnais.

The special feature of this example is that Crédit Lyonnais, unlike an American bank, is not a member of the Federal Reserve System. This used to mean that the bank, because it was foreign, did not have a reserve account at the Fed and therefore had to keep its dollars on deposit in a U.S. bank, but ever since passage of the 1978 International Banking Act, foreign bank branches operating in the United States have been required to hold reserves at the Fed and consequently must have an account there. These branches have, however, continued to make and receive the bulk of their payments through a deposit account they maintain at their U.S. correspondent bank. One reason is that the Fed permits a foreign bank branch to run only a very small daylight overdraft in its Fed account. The Fed recently increased the overdraft limit for foreign banking organizations classified as financial holding companies under the Gramm-Leach-Bliley Act. Nevertheless, the limit is smaller than the amount granted to domestic banks, a point of contention among foreign banks.

To continue our example, suppose that the dollars placed by Bank of America London with the London branch of Crédit Lyonnais are deposited in a Crédit Lyonnais account at JPMorgan Chase New York. Then, as Table 7.4 shows, the net effect of the transaction will be that Crédit Lyonnais ends up with dollars on deposit in New York, and reserves move from Bank of America's account at the Fed to JPMorgan Chase's account. Note again that the dollars remain in New York, even though they are now held by the London branch of a French bank.

TABLE 7.4

A Eurodollar interbank placement

Bank of America London		Crédit Lyonnais London	
(Eurodollar) time deposit, Crédit Lyonnais London		Deposit, Morgan N.Y.	Time deposit, Bank of America London
+20MM		+20MM	+20MM
New York office dollar account			
-20MM			
Bank of America New York		JPMorgan Chase New York	
Reserves	-20MM	Reserves	+20MM
	London office dollar account		Deposits, Crédit Lyonnais London
	-20MM		+20MM
New York Fed			
		Reserves, Bank of America	-20MM
		Reserves, Morgan	+20MM

Note: MM represents millions.

In constructing our example, we tried to keep things simple and so ignored an important detail, namely, how Eurodollar transactions are cleared. In the United States, it is customary for banks to make payments between one another in federal funds, that is, by transferring funds on deposit at the Fed via Fedwire (see Chapter 12); all large payments in the money and bond markets are also made in fed funds. In contrast, in the Eurodollar market money transfers are made and settled through the New York clearinghouse known as *CHIPS*—an acronym for the computerized clearinghouse interbank payments system. Payments made through CHIPS used to result in the receipt of *clearinghouse funds*, which became fed funds only on the day after receipt. The distinction between fed funds (good money today) and clearinghouse funds (good money tomorrow) did several things: it set the stage for banks to engage in profitable

technical arbitrages between the two sorts of funds; it also was the source of no end of confusion for foreigners dealing for the first time in the Eurodollar market; and finally, as volume on CHIPS grew, it created an overnight credit risk that both CHIPS and the Fed eventually deemed unacceptable.

Reacting to this risk, CHIPS moved on October 1, 1981, to same-day settlement. Two decades later in 2001, CHIPS shifted to a system that made funds available immediately, a system that had been in place at the Fed for years via its Fedwire system. By the middle of 2006, CHIPS was processing \$1.5 trillion in payments per day. For more about CHIPS—its history, method of operation, and relationship to Fedwire—see Chapter 18.

HISTORY OF THE MARKET

Anyone following Tables 7.1 through 7.4 is likely to wonder what the rationale is for carrying on outside the United States huge volumes of dollar deposit and loan transactions in what seems to be a rather complicated fashion. Moreover, how, in light of these complications, did the Eurodollar market reach \$2.2 trillion in size by the middle of 2004?² The best way to answer is to describe briefly the stimuli that gave birth to the Eurodollar market.

Long before World War II, it was not uncommon for banks outside the United States to accept deposits denominated in dollars. However, the volume of such deposits was small, and the market for them had little economic significance. During the 1950s, things began to change. One reason was the activities of the communist central banks. Since Russia and other communist countries imported certain goods that had to be paid for in dollars and exported others that could be sold for dollars, the central banks of these countries ended up holding dollar balances. Initially, these balances were held on deposit in New York, but as Cold War tensions heightened, this practice became less attractive to the communists, who feared that at some point the United States might block their New York balances. As a result, they transferred these balances to banks in London and other European centers. The value of the dollar goods the communist countries wanted to import often exceeded the amount of dollars they were earning

² Robert McCauley, "Distinguishing Global Dollar Reserves from Official Holdings in the United States," The Bank for International Settlements, *BIS Quarterly Review*, September 2005.

on exports, so these countries became important in the Eurodollar market, not only as lenders but as borrowers.

While the Cold War may have kicked off the Eurodollar market, other factors stimulated its development. Historically, the pound sterling played a key role in world trade. Much trade, not only within the British Commonwealth but between Commonwealth nations and the rest of the world and between third countries, was denominated in British currency, the pound sterling, and financed in London through borrowings of sterling. After World War II, this began to change. Britain ran a big balance of payments deficits (that is, it spent more abroad than it earned); and as a result, devaluation of the British pound—a decrease in the amount of foreign exchange for which a pound could be traded—was a constant threat and in fact occurred several times during the period of pegged exchange rates. The chronic weakness of the pound made it a less attractive currency to earn and to hold, which in turn stimulated the trend for more and more international trade to be denominated in dollars. It also caused the British to restrict the use of sterling for financing international trade. Specifically in 1957, the British government restricted the use of sterling in financing trade between non-sterling-area countries; and in 1976, it restricted the use of sterling in financing trade between Commonwealth countries and non-sterling-area countries. Because of the increased use of dollars as the availability of sterling financing decreased, importers began borrowing Eurodollars to finance trade, and the Eurodollar market emerged first as a nascent and then as a fast-growing and important international capital market.

In the early days of the Eurodollar market, it was British banks and not U.S. banks that played a leading role. Historically, British banks had a dominant place in financing world trade, so they had expertise other banks lacked. Given that expertise, British banks shrewdly took the view that they could finance international trade in whatever currency was available and acceptable—wampum beads or, as happened to be the case, dollars.

U.S. banks entered the Eurodollar market step by step and always *defensively*—their fear being that their London activities would undercut their domestic activities. One U.S. banker, who was in London during the market's formative years, noted, "The story of how the U.S. banks entered the Eurodollar market reflects rather poorly on us because we did not think out where the market was going. It just sort of grew up on us."

During the early 1950s when the Russian and Eastern European banks began depositing dollars outside the United States, the London branches of U.S. banks were *not* taking Eurodollar deposits. Several years later, they began to do so hesitantly when some of their good U.S. customers said to them, “Can’t you take our dollar deposits in London? The foreign banks do, and they give us better rates than you can in New York because of Regulation Q.” For several years, this worked satisfactorily because the head offices of the U.S. banks involved could profitably use in the United States the dollars deposited with their London branches: in the United States, the structure of loan and other interest rates was such that U.S. banks could well afford to pay in London higher rates than those permitted under Reg Q.

Then the London branches of U.S. banks began getting 3- and 6-month money that the head offices of U.S. banks did not want because it did not fit their books (asset and liability structures). So, again *defensively*, the London branches of the U.S. banks began making Eurodollar loans to commercial customers and placements of deposits with foreign banks. In doing so, they said, “We are giving you this money, but don’t count on our continuing to do so because we don’t know how long we will continue getting this funny money called Eurodollars.” For years, U.S. banks did not view their Eurodollar activities with a customer as a traditional, ongoing banking relationship.

In its initial stages, the growth of the Eurodollar market was hampered by myriad exchange control regulations that all nations except the United States imposed on their residents with respect to (1) the use of domestic currency to acquire foreign exchange and (2) the disposition of foreign-exchange earnings. This changed in 1958 when the major European countries, with the exception of the United Kingdom, substantially liberalized their foreign-exchange controls as a first step toward making their currencies fully convertible.

A fourth factor that stimulated the growth of the Eurodollar market was the operation of Regulation Q during the tight money years of 1968 and 1969. At that time, U.S. money rates rose above the rates that banks were permitted to pay under Reg Q on domestic, large-denomination CDs. To finance loans, U.S. banks were forced to borrow money in the Eurodollar market. All this resulted in a sort of merry-go-round operation. A depositor who normally would have put his money in, say, a Citibank New York CD gave his money (perhaps via a Canadian bank because of U.S. controls on the export of capital) to Citibank London, which then lent the money

back to Citibank New York. In effect, Reg Q forced a portion of the supply of bought money that U.S. money market banks were coming to rely on in funding to move through London and other Eurodollar centers. The operation of Regulation Q also encouraged foreign holders of dollars who would have deposited them in New York to put their dollars in London. Thus, for example, surplus German dollars borrowed by Italians ended up passing through London instead of New York.

Another important stimulus to the Eurodollar market was the various capital controls that the United States instituted during the 1960s to improve its balance of payments, which was in deficit. The first of these, the Interest Equalization Tax passed in 1964, was designed to discourage the issuance by foreign borrowers of debt obligations in the U.S. market. This measure was followed in 1965 by the Foreign Credit Restraint Program, which limited the amount of credit U.S. banks could extend to foreign borrowers. Finally in 1968, the government passed the Foreign Investment Program, which restricted the amount of domestic dollars U.S. corporations could use to finance foreign investments. Whatever the wisdom and effectiveness of these programs (they were eliminated in 1974), there is no doubt that they substantially increased the demand for dollar financing outside the United States, that is, for Eurodollar loans.

The persistent balance of payments deficits in the United States have often been given substantial credit for the development of the Eurodollar market; by spending more abroad than it earned, the United States in effect put dollars into the hands of foreigners and thus created a natural supply of dollars for the Eurodollar market. This argument is still being made today and has been oft cited as a reason for the low level of long-term interest rates in the early 2000s. There is some truth to this argument, but U.S. balance of payments deficits are neither a necessary nor a sufficient condition for a thriving and growing Eurodollar market. After all, foreigners can deposit dollars in New York, *and* domestic holders of dollars can place them in London. Where dollars are held need not be a function of who owns them. It is often a function of the relative attractiveness of the domestic and the Eurodollar markets to depositors. What has made the Eurodollar market attractive to depositors and given it much of its vitality is the freedom from restrictions under which this market operates and in particular the absence of the implicit tax that exists on U.S. domestic banking because of the reserve requirements imposed by the Fed. Eurodollar deposits taken by U.S. banks are also free from the insurance

premiums imposed by the Federal Deposit Insurance Corporation (FDIC).³ For a variety of reasons, Eurodollar deposits are not insured by the FDIC. In particular, the FDIC does not have access to the records kept by foreign banks. Another risk, albeit not a large one, is *basis risk*. For example, three-month Eurodollar rates are not perfectly correlated with Treasury bill yields. This means that if the two rates diverge, a bank's asset-liability mix might be negatively affected.

A final important stimulus was given to the Eurodollar market by the hike in the price of oil that occurred in 1974. Because of that rise, member nations in the Organization of Petroleum Exporting Countries (OPEC) suddenly found themselves holding massive balances of dollars, which they deposited in the Eurodollar market. Meanwhile, many countries that were importers of oil experienced severe balance of payments difficulties and were forced to borrow dollars in the Eurodollar market to pay for oil imports. As we show earlier in our reference to Russia and its swelling dollar reserves, the impact of oil on the Eurodollar market continues to this day.

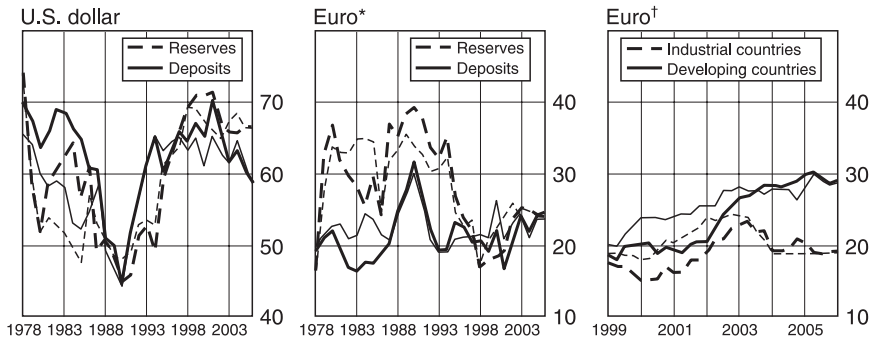
EUROCURRENCY DEPOSITS

Just as dollars can be deposited in banks and bank branches outside the United States to create Eurodollars, the currencies of European countries can be deposited outside their country of origin and thereby give rise to other types of *Eurocurrency deposits*. For example, Japanese yen, deposited in London in exchange for a yen balance are *Euroyen*. The major currencies other than dollars in which Eurocurrency deposits are held are the European euro, the British pound, Swiss francs (*Swissy* to the irreverent), and yen. While the Euromarket is still primarily a dollar market, Eurodeposits of other currencies are an important and growing part of the market. It is notable, for example, that at the end of March 2006, the dollar's share

³ According to the FDIC, the availability of deposit insurance is not limited to citizens and residents of the United States. Any person or entity that maintains deposits in an insured depository institution is entitled to the deposit insurance provided by the act governing the FDIC. In addition, deposits denominated in a foreign currency are insured. Deposits in an insured branch of a foreign bank which are payable by contract in the United States are insured, except that any deposits to the credit of the foreign bank, or any office, branch, agency, or any wholly owned subsidiary of the foreign bank, shall not be insured.

FIGURE 7.3

Currency composition of reserves (as a percentage of total allocated foreign currency holdings)



Note: Thick lines calculated at market values ("value" shares); thin lines calculated at end-2005 exchange rates ("quantity" shares).

* Prior to 1999, identified euro legacy currencies.

† As a percentage of reserves.

Sources: International Monetary Fund, Bank for International Settlements

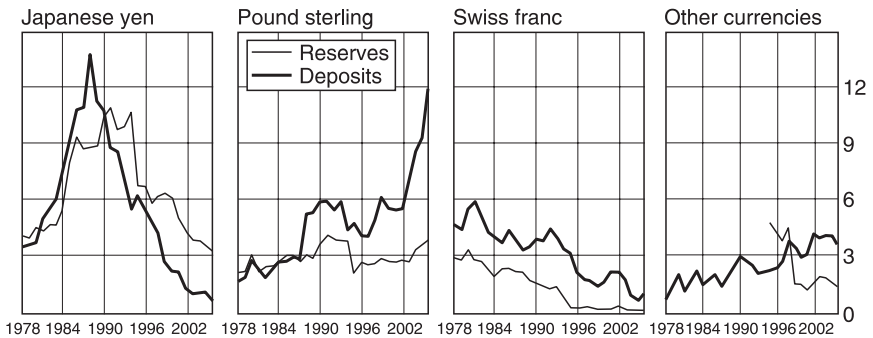
of foreign currency reserves had fallen to 66% of reserves from a nearly 30-year high of 70% in 2001 (Figure 7.3). Moreover, the share of dollar-denominated currency reserves held in bank deposits fell to 59% at the end of March 2006 from 70% in 2001. There are a few reasons for the decline, including the introduction of the euro in 1999 and the fact that the dollar's value was falling during much of the period, a factor that in the past was also associated with decreases in the proportion of dollar holdings as a percentage of all reserve assets. Currencies that have seen the largest divergence in holdings include the Japanese yen and the British pound, reflecting worsened perceptions about Japan's financial system that developed in the 1990s (Figure 7.4).

THE MARKET TODAY

The globalization of finance has been far reaching over the past few decades, and there often seems to be no limit to how far it can go. It has become quite simple, for example, for even small investors to gain access to financial markets worldwide. Moreover, those in need of capital can

FIGURE 7.4

Currency composition of reserves (at market values, as a percentage of total allocated foreign currency holdings)



Sources: International Monetary Fund, Bank for International Settlements

readily obtain it from a wider variety of sources outside their home country. Similarly, borrowers today are the beneficiaries of the increased flow of capital across borders.

While the globalization of the financial markets has been stark and there have also been significant advances in the integration of banking worldwide (as evidenced in part by the top 10 list of U.S. banks ranked by asset size shown in Chapter 6), the integration of the banking industry has been slower than it has been for the financial markets. Indeed, by 2001, the foreign share of bank assets in most industrialized countries was either at or below 10%.⁴ Much economic research exists on the topic, with many studies concluding that relationships with particular banks are significantly influenced by both the physical presence of a bank as well as its knowledge about local markets. These factors are seen as being far more influential than factors such as a bank's size and international reach.

Although over a decade old, many studies use the results of a 1996 survey as support. The survey, meant to gather information on the short-term banking services of European banks, is titled "GlobalCash-Europe96." It was conducted across 20 European countries by the

⁴ Stijn Claessens, Asli Demirgüçunt, and Harry Huizinga, "How Does Foreign Entry Affect the Domestic Banking Market?" *Journal of Banking and Finance*, May 2001.

Bank Relationship Consultancy and the School of Management at the University of Bath, in the United Kingdom. The survey canvassed the banking practices of more than 2,000 European affiliates of multinational corporations. The survey asked corporations to identify the banks their foreign affiliates used for short-term banking services within each of the 20 countries. The objective was to see whether the affiliates dealt with *host-nation*, *home-nation*, or *third-nation* banks. For purposes of the study, host-nation banks are those that are headquartered in the country in which the affiliate operates; home-nation banks are those headquartered in the same country in which the affiliate's parent is headquartered; and third-nation banks are those that are headquartered in neither the home nor host country. In order to characterize the reach of these banks, the banks were classified as global, regional, or local.⁵

A key finding in the study that continues to find support is that affiliates tend to bank with host-nation banks more so than with other banks. The main reason time and time again seems to be that local banks tend to have better information, relationships, and insights with respect to their local market than do other banks. This is a key reason why the banking industry may never become as fully integrated as the financial markets.⁶ There are ostensibly a number of banking services in which local banks hold comparative advantages and in which other banks in some cases can't compete at all. In discussing the preference for local banks, Federal Reserve Governor Mark Olson said in a 2004 speech that, "The single most important factor influencing a customer's choice of banks is the location of the institution's branches."⁷

Borrowers and Lenders Stay Close to Home

If the integration of the international banking system were progressed, borrowers would probably seek funds from banks outside their local area

⁵ For further explanation into the methodology and findings of the study, see Allen Berger and David Smith's "Global Integration in the Banking Industry," *Federal Reserve Bulletin*, November 2003.

⁶ Allen Berger, Qinglei Dai, Steven Ongena, and David C. Smith, "To What Extent Will the Banking Industry Be Globalized?" Board of Governors of the Federal Reserve System, *Finance and Economic Discussion Series*, May 2002.

⁷ Mark W. Olson, "Remarks at the Fortieth Annual Conference on Bank Structure and Competition," sponsored by the Federal Reserve Bank of Chicago, May 6, 2004.

TABLE 7.5

Percentage of syndicated loan volume in each market resulting from borrowers in each domicile, from a study conducted for 1992–2002

Borrower Domicile	U.S. Market	European Market	Asian and Southwest Pacific Market
United States	97.7	3.2	2.6
Europe	0.5	81.8	1.0
Latin America	0.2	6.3	0.3
Canada	1.0	0.6	0.0
Asia and Southwest Pacific	0.1	1.9	94.4
Other	0.5	6.2	1.7
Total	100.0	100.0	100.0

Sources: Federal Reserve, Loanware

with increased frequency. The data suggest a different pattern, however. Table 7.5 shows how borrowers in each of the respective locations allocated their syndicated loan borrowings across the three markets shown.⁸ The data clearly show that borrowers tend to stay home and that Europe is generally chosen by borrowers outside the three markets. More to the point, U.S. firms during the survey period almost always issued debt in the U.S. market, with 97.7% of borrowers choosing lenders from the U.S. market; European firms issued debt in the European market; and Asian firms issued debt in the Asian market. Firms in regions of the globe with no natural local syndicated loan market—notably Latin American firms—tend to gravitate toward Europe, despite the fact that the U.S. market is larger. Particularly revealing is the fact that Canadian firms issued 19.4% of their loans in the European market, a noteworthy tally given the integration of the U.S. and Canadian markets.

Although borrowers rarely cross borders to obtain funds, lenders show more willingness to cross borders. Table 7.6 shows this contrast. The table indicates that 20% to 30% of lending in each market is carried out

⁸ Mark Carey and Greg Nini, “Is the Corporate Bond Market Globally Integrated? A Pricing Puzzle,” Board of Governors of the Federal Reserve System, *International Finance Discussion Papers*, August 2004.

TABLE 7.6

Banks are more willing to cross borders than borrowers are. Out-of-market lender share of syndicated loans in each market during 1992–2002

Market	Percentage of Lenders from Outside the Market		Percentage of Lead Lenders from Outside the Market	Number of Lenders in Syndicate	
	By Volume	By Number	By Number	Median	Mean
United States	29	21	12	4	8
Europe	23	20	19	8	11
Asia	21	19	17	7	9

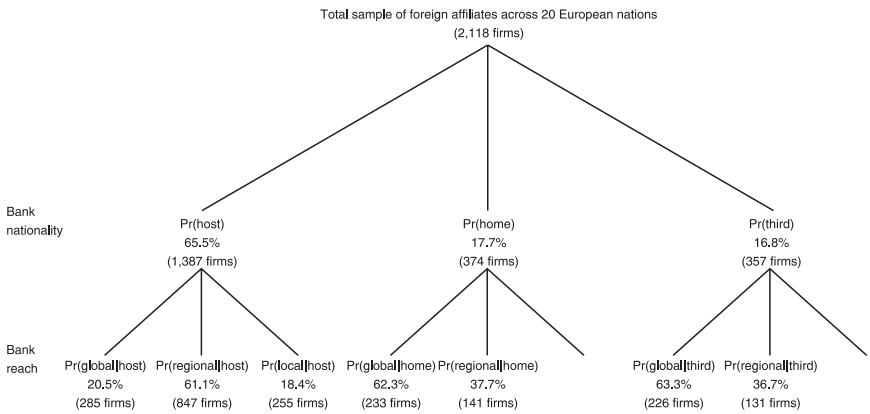
Sources: Federal Reserve, Loanware

by out-of-region lenders. As a sidebar it is notable that the percentage of *lead* lenders is smaller, particularly in the U.S. market where only 12% of lead lenders are foreign.

Figure 7.5, constructed by Berger, Dai, Ongena, and Smith (2002), further highlights the preferences found among the over 2,000 affiliates in the GlobalCash-Europe96 survey. The chart is a so-called decision tree, which is a graph that shows the various layers of decisions that can be made and their possible consequences. In the first stage of the decision process shown at the top of the chart, the affiliates decide on which bank nationality they would prefer to choose. In the second stage, affiliates must then decide on bank reach, which refers to the size and geographic scope of a bank. As the chart shows, in the first stage, affiliates tend to gravitate toward host-nation banks, with 65.5% of affiliates choosing these banks. Affiliates that choose a host-nation bank tend to stay with regional banks, as indicated by the fact that 61.1% of these affiliates then choose regional banks. The percentage of affiliates that choose local banks tends to be smaller, indicating that the preference for staying local has its limits. Affiliates choosing regional banks probably want banks that blend their international reach with local services and expertise. Figure 7.5 highlights another important trend. The chart shows that when affiliates choose either a home-nation bank or a third-nation bank, they then choose a bank whose reach is global.

FIGURE 7.5

Firm choice of bank nationality and reach—firms across all host nations



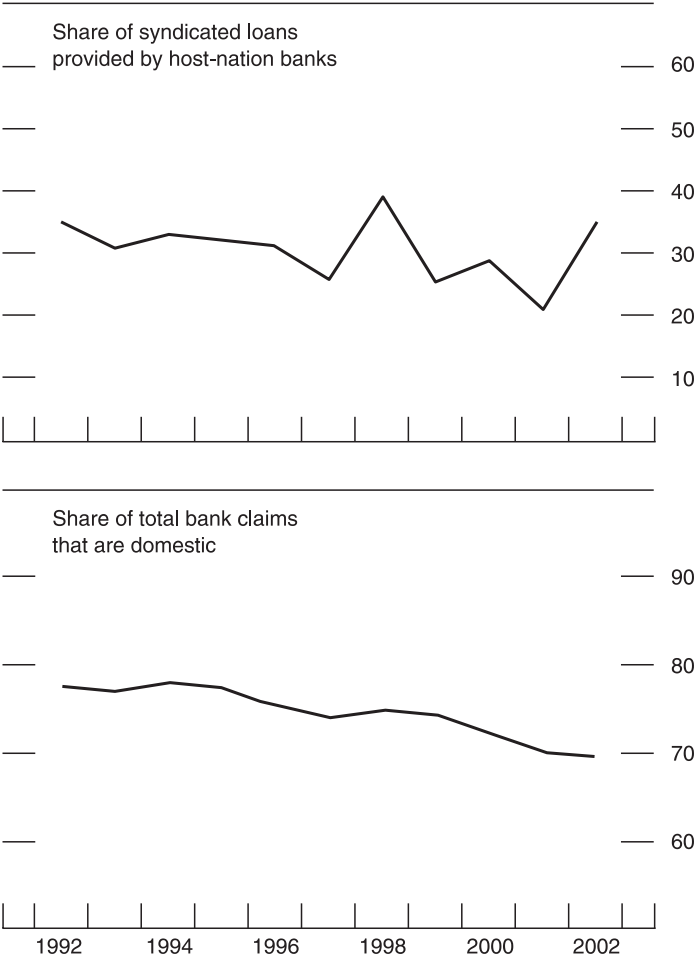
Source: Federal Reserve

The trends cited above do not appear to have changed much in recent years, although some evidence of increased integration of the banking sector has emerged. Figure 7.6 shows this. The top panel indicates that in 2002 the proportion of syndicated loans financed by host-nation banks was unchanged from 10 years earlier, at 35%. The chart seems to have a downward tilt, however, suggesting some degree of increased integration. The bottom panel is more revealing. It shows that the share of total bank claims that are on domestic customers has fallen steadily over the years, a chart which suggests an increase in the level of integration (Berger and Smith, 2003).

Much of what we discuss appears to indicate that the pace of integration in the banking sector has been slow. It is reasonable to question whether the integration has been slowed by a lack of encouragement among the world's major banking sectors. After all, each of the centers probably sees it in its own interest to protect banks within its realm. As evidence of the fact that other factors such as culture, language, and local expertise are more important than any protective measures that could be at play, it is notable that in Europe, where the European Union (EU) has stated that a single, integrated banking market is a key objective, the pace of integration has also been very slow. Europe serves as a superior case study of the globalization of the banking industry and can serve as a benchmark for

FIGURE 7.6

Indicators of banking market integration in Europe, 1992–2002



Source: Federal Reserve

studies about the integration of the global banking system. In addition to encouragement from the EU, integration of the European banking system is facilitated by the fact that European nations are in close proximity to one another, and there are virtually no formal regulatory restrictions on cross-border bank entry within the EU (Berger, Dai, Ongena, and Smith, 2002).

These findings show that barriers to the globalization of the banking industry are formidable and will probably lag the globalization of the financial markets for quite some time.

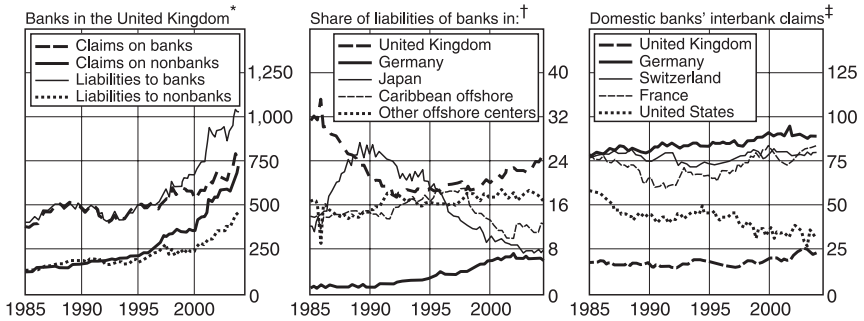
EURODOLLAR BANKING CENTERS

Over time, the Eurodollar market has undergone great changes: it has grown from meager beginnings into a huge international capital market that deals in increasingly complex and ever more numerous products. One aspect of this market has, however, not changed: the preeminence of London as its center. This changed briefly in the late 1980s and early 1990s when Japan's banks had a greater share of dollar liabilities, but persistent problems in Japan's financial system put Japan far behind London in the early 2000s, with London accounting for roughly 25% of all U.S. dollar liabilities in banks located outside the United States compared to only around 8% in Japan (Figure 7.7). Looking more broadly, London is also the recipient of 35% of all deposits held by global monetary authorities, more than in any other financial center.⁹

THE PREEMINENCE OF LONDON

From the inception of the Eurodollar market, London has been its biggest and most important center. That this role fell to London is hardly surprising. London has a long history as a world center for a host of financial activities: international lending, trade financing, commodities trading, stock trading, foreign-exchange trading, insurance, and others. In truth, that square mile of London known as *the City of London*, or more often as just *the City*, is and has been since the nineteenth century the financial capital

⁹ Gabriele Galati and Philip Wooldridge, "The Euro as a Reserve Currency: A Challenge to the Pre-Eminence of the U.S. Dollar?" The Bank for International Settlements, BIS Working Papers, October 2006.

FIGURE 7.7**U.S. dollar international claims and liabilities**

* In billions of U.S. dollars.

† The share of U.S. dollar liabilities of selected reporting countries in total U.S. dollar liabilities of all reporting countries excluding the United States, in percent.

‡ Calculated as the share of total claims on banks for each reporting country that is accounted for by banks headquartered in the reporting country, in percent. For example, German banks' share of Germany's total claims on the banks.

Source: Bank for International Settlements

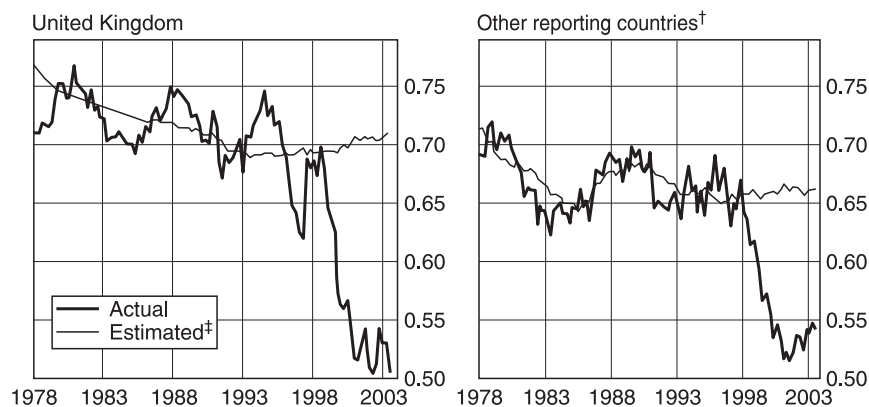
of the world. London continues to be the largest depository of Eurodollars in the world, although more of the money deposited in London is being directed to nonbank borrowers than in years past, particularly to the United States.¹⁰ This is evidenced by the interbank recycling ratio, which shows the extent to which dollars deposited in the United Kingdom have been recycled into the banking system (Figure 7.8). The decline likely reflects the impact of the introduction of the euro and the drop that has resulted in the number of transactions involving the dollar as a conduit currency. Another major influence has likely been the substantial amount of consolidation that has occurred in the banking system worldwide (McGuire, 2004).

Some of the many factors that contributed to London's development as an international financial center were the freedom and flexibility with which financial institutions were permitted to operate there. That freedom and flexibility still prevail, and because they do, London—with its huge concentration of financial expertise—was the logical place for

¹⁰ Patrick McGuire, "A Shift in London's Eurodollar Market," The Bank for International Settlements, *BIS Quarterly Review*, September 2004.

FIGURE 7.8

Interbank recycling ratio*



* Calculated as total U.S. dollar claims on banks normalized by total U.S. dollar liabilities vis-à-vis banks and nonbanks.

† Based on an aggregate across 13 countries for which a complete time series is available. Excludes the United Kingdom and the United States.

‡ Based on an estimated cointegrating vector which includes a constant and a trend term and uses data up to 1997.

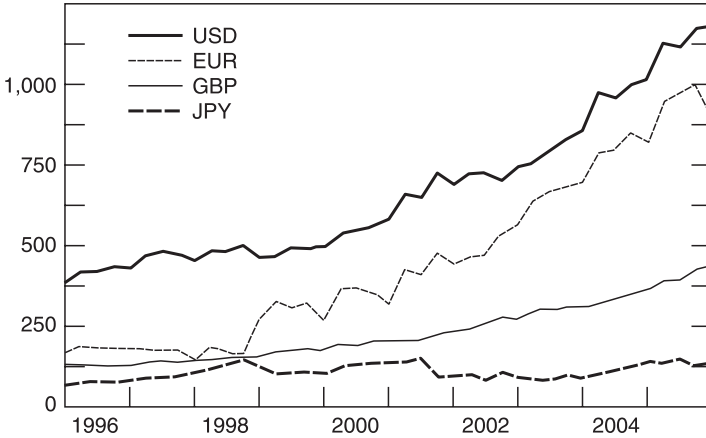
Source: Bank for International Settlements

the nascent Eurodollar market to develop and flourish. Throughout London's history as a Eurocenter, foreign banks have been permitted to open London branches and subsidiaries with ease and to operate these branches and subsidiaries with a minimum of regulation. The Bank of England has imposed no specific capital requirements on the London branches of foreign banks, and it has imposed no reserve requirements on the Eurocurrency deposits they accept. Britain *taxes the profits* earned by foreign banks' branches and subsidiaries but has imposed *no withholding taxes* on the interest banks pay to nonresident depositors.

While London has remained the preeminent center of the Eurodollar market, other centers have also developed. The Euromarket is, after all, a worldwide market. The most prominent market is the Caribbean offshore market, as is shown in Figure 7.7. It is surprising that no major center has yet to develop in the Far East given the very large trade deficits that the United States has experienced with China and Japan in particular. Still, as evidenced by Figure 7.9, much of the world's Eurocurrencies continue to be directed into London.

FIGURE 7.9

International deposits in London*



* Outstanding liabilities to nonresidents of commercial banks located in the United Kingdom, excluding interoffice positions; in billions of U.S. dollars; amounts in other currencies are converted to U.S. dollars at end-2005 exchange rates.

Source: Bank for International Settlements

Next to London, the second most important center of the Euromarket is New York. Until the opening of international banking facilities (IBFs) there, New York banks could not accept Eurodollar deposits, but New York was still an important center in Euro trading for several reasons. First, New York banks and the branches established in New York by major foreign banks are active takers of Eurodollars in the names of their Grand Cayman branches. A second reason for the prominence of New York as a Eurodollar center is that many of the nation's largest banks direct their worldwide Eurodollar operations from New York.

SIZE OF THE MARKET

From rather meager beginnings, the Euromarket has developed into a huge market. The best figures available are the estimates made by the Bank for International Settlements. Its figures (Table 7.7) cover Eurodeposits in all significant Eurocenters. From these net figures, it is evident that both Eurodollar and Eurocurrency deposits continue to grow at a fast pace.

TABLE 7.7

Cross-border claims of BIS reporting banks—exchange rate adjusted changes in amounts outstanding, in billions of U.S. dollars*

	2003	2004	2004	2005				
	Year	Year	Q4	Q1	Q2	Q3	Q4	Stocks at end-Dec. 2005
Total cross-border claims	1,061.2	2,269.2	573.6	1,028.3	1,079.3	534.8	566.7	21,109.6
on banks	519.7	1,351.9	346.9	590.9	767.4	279.2	343.5	13,376.0
on nonbanks	541.5	917.2	226.7	437.4	311.9	255.7	223.2	7,733.5
Of which loans:								
banks	443.6	1,122.6	284.3	480.1	697.0	219.9	221.9	11,339.2
nonbanks	274.3	344.8	124.7	292.8	97.4	141.8	1.8	3,844.3
Of which securities:								
banks	74.5	154.1	36.6	110.1	45.1	54.8	78.2	1,485.8
nonbanks	207.6	456.7	58.3	81.7	235.4	77.3	162.4	3,347.9
Total claims by currency								
U.S. dollar	578.4	1,125.3	435.4	253.0	517.6	245.2	216.6	9,289.1
Euro	499.5	807.9	124.7	589.0	382.9	169.2	175.4	8,008.4
Yen	-127.6	89.6	23.7	-33.1	68.6	24.4	92.7	1,145.9

Other currencies [†]	110.9	246.4	-10.1	219.4	110.2	96.0	81.9	2,666.2
By residency of nonbank borrower								
Advanced economies	448.0	673.7	150.8	373.6	224.5	186.1	167.8	5,956.7
Euro area	156.4	239.2	43.8	110.5	152.0	58.7	134.5	2,661.5
Japan	38.4	73.3	36.2	-31.5	10.1	-11.0	6.1	223.3
United States	172.1	164.7	45.8	207.2	33.7	110.6	30.8	2,026.0
Offshore centers	99.8	239.8	57.9	56.5	64.8	45.4	8.5	1,024.8
Emerging economies	6.0	50.2	22.4	13.6	21.3	22.2	50.9	713.3
Unallocated [‡]	-13.5	-41.5	-4.7	-6.6	0.0	-1.6	-1.8	9.9
<i>Memo: Local claims[§]</i>	<i>408.6</i>	<i>219.9</i>	<i>-6.1</i>	<i>233.5</i>	<i>-4.6</i>	<i>26.6</i>	<i>-54.9</i>	<i>2,782.3</i>

* Not adjusted for seasonal effects.

† Including unallocated currencies.

‡ Including claims on international organizations.

§ Foreign currency claims on residents of the country in which the reporting bank is domiciled.

Source: Bank for International Settlements

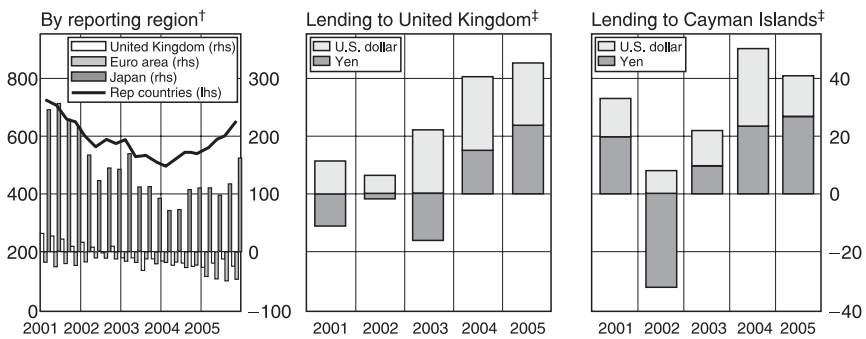
As the table shows, cross-border claims were \$21.110 trillion at the end of 2005, a 17% gain from 2004 when claims increased by \$2.269 trillion, or roughly 15%. In 2005, the gain was led by a sharp increase in intra-euro lending, as well as a sharp increase in the amount of yen-denominated claims (Figure 7.10), reflecting increased yen borrowing by residents of the United Kingdom and offshore centers, possibly to fund so-called carry trades where yen borrowers seek a return exceeding the interest rate they pay for borrowing yen. The increase in yen borrowing likely also reflects improvements in the health of Japan’s banking sector, and the rise in U.S. interest rates, which has spurred borrowers to shift their borrowing to yen in order to capture the low level of rates that exist there—Japan’s interest-rate levels have been the lowest among industrialized nations.

THE MAJOR PLAYERS: GLOBAL BANKS

Today’s list of top 10 banks worldwide contains banks from all over the globe (Figure 7.11). This wasn’t always the case, as the list was once dominated by Japanese banks. Indeed, in 1989, Japan’s banks held all

FIGURE 7.10

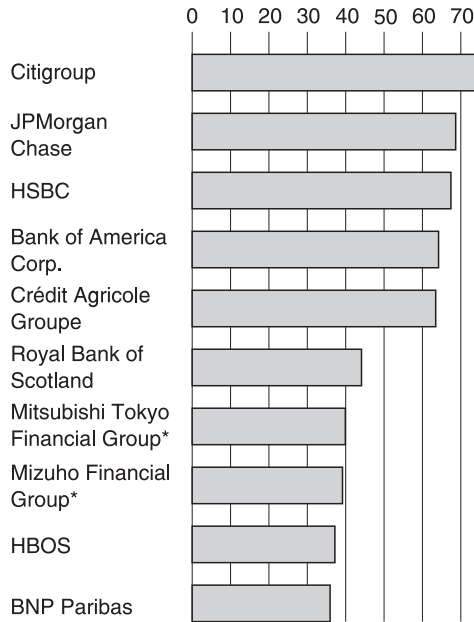
Bank lending in yen*



* Based on stocks outstanding adjusted for valuation effects using a constant 2005 Q4 exchange rate.
† Net claims (for reporting countries total, gross claims), in billions of U.S. dollars. Excludes claims on and liabilities to residents of Japan.
‡ Year-on-year growth, in percent.
Source: Bank for International Settlements

FIGURE 7.11

The world's biggest banks (tier-1 capital, end-2004, in billions of dollars)



* End March 2005.

Sources: The Banker, The Economist

5 top spots and a total of 7 in the top 10 global ranking. Today, Japan has just 2 banks on the top 10 list, and U.S. banks have the most banks on the top 10 list with a total of 3. Notable, however, is that no particular banking sector dominates the way Japan once did. Some of today's names have been staples among the rankings of top global banks for 15 years in one form or another, including Citibank, Crédit Agricole, JPMorgan Chase, and Mitsubishi. In general, however, the names are largely new, or at least look new because of the significant amount of consolidation that has occurred in the banking industry.

Many banks have eclipsed the \$1 trillion mark in terms of total assets including Citigroup, HSBC, Bank of America, JPMorgan Chase, Mitsubishi

UFJ, Crédit Agricole, Royal Bank of Scotland, Mizuho Financial Group, Barclays, ABN Amro, UBS, Deutsche, BNP Paribas, Société Générale, and Credit Suisse. Interestingly, while no Chinese bank has yet reached the \$1 trillion mark, the Industrial and Commercial Bank of China is getting close, with assets of close to \$800 billion.

Since U.S. banks have in recent years felt pressure to pare assets and to improve earnings ratios, one might argue that a ranking of banks by shareholder equity might be a more appropriate and fairer criterion by which to judge the importance on a world scale of U.S. banks. Switching criteria does in fact improve the standing of the top U.S. and European banks, as shown in Table 7.8.

OVERVIEW OF BANK EURO OPERATIONS

In a very real sense, the Eurodollar market is a true international market without location, which means that for no bank is it a domestic market. Thus, every bank active in the market tends to compartmentalize its activities there, to think in terms of what Eurodollar assets and liabilities it has acquired. In the jargon of the market, every Eurobanker is running a

TABLE 7.8

2006 global ranking by shareholder equity
(in millions of dollars)

Rank	Entity	Score
1	Citigroup	112,537.00
2	JPMorgan Chase	107,211.00
3	Bank of America	101,224.00
4	HSBC	98,226.00
5	Mitsubishi UFJ Financial Group	83,281.00
6	Groupe Crédit Agricole	65,137.00
7	Royal Bank of Scotland Group	64,453.00
8	BNP Paribas	56,610.00
9	Santander Central Hispano	53,640.00
10	Mizuho Financial Group	52,243.00

Source: Euromoney

Eurodollar book. In the case of foreign banks, the reason is obvious; they are dealing in a foreign currency, the dollar, which has limited availability to them at best. In the case of U.S. banks, the distinction between domestic and Eurodollar operations arises from a less fundamental but still important consideration, namely, the fact that Fed reserve requirements and other factors create a real distinction between Eurodollars and domestic dollars, one that is of varying importance depending on economic conditions and on the maturities of the domestic and Eurodollar assets and liabilities compared. While U.S. bankers continue to speak of their Eurobook as distinct from their domestic book, many view their job as managing a single, unified *global book*.

Banking ground rules in the Euromarket differ sharply from those prevailing in the U.S. banking scene, with the result that U.S. bank operations in the Euromarket also differ sharply from its operations in the domestic money market. Thus, we present a quick overview of bank Euro operations before we talk in detail about some of the deposit-accepting and lending activities in this market.

The first important distinction between U.S. banks' domestic and Euro operations is in the character of their liabilities. In the Euromarket, all deposits, with the exception of *call money*, have a fixed maturity (*tenor*, in British jargon) which may range anywhere from one day to five years. Also, interest is paid on *all* deposits, the rate being a function of prevailing economic conditions and the maturity of the deposit. While most bank Eurodollar liabilities are straight time deposits, banks operating in the London market also issue Eurodollar CDs. These instruments carry a fixed rate of interest, are issued for a fixed time span, and are negotiable.

For U.S. banks, a second important distinction between their domestic and Euro operations is that no reserve requirements and no FDIC premiums are imposed on their Eurocurrency deposits. Thus, they can invest every dollar of Eurodollar deposits they receive.

Banks accepting Eurodollar deposits use these dollars to make two sorts of investments: loans and interbank placements. All such placements, like other Eurodeposits, have fixed maturities and bear interest. The market for Eurodollar deposits, nonbank and interbank, is highly competitive, and the rates paid on deposits of different maturities are determined by supply and demand. Since the Euromarket operates outside the control of any central bank, there are no Reg Q or other controls limiting or setting the rates that Eurodollars may command. Still, in reality,

Eurodollar rates tend to closely track the fed funds rate, as we show in greater detail in Chapter 18.

LIBOR, LIBID, LIMEAN

The rate at which banks in London offer Eurodollars in the placement market is referred to as the *London Interbank Offered Rate*, **LIBOR** for short. The rate at which Eurodollars are bid goes by the acronym **LIBID**, the *London Interbank Bid Rate*. **LIMEAN** is the mean of LIBOR and LIBID. Naturally LIBOR, LIBID, and LIMEAN are each a family of rates, one for each tenor quoted; for example, there are separate quotes for 1-, 3-, and 6-, and 12-month LIBOR. Normally, the spread between LIBOR and LIBID is very small, but it can widen because of market uncertainty or illiquidity. As noted in later chapters, LIBOR, because it is the true global cost of money, has become a key benchmark rate in the U.S. domestic money market. For example, in the U.S. commercial paper market, value is measured in terms of the spread at which such paper trades to LIBOR, not to T-bills.

In the Euromarket, unlike the domestic market, all loans have fixed maturities, which can range anywhere from a few days to five years or longer. The general practice is to price loans at *LIBOR plus a spread*. On some term loans, the lending rate is fixed for the life of the loan. By far the more usual practice, however, is to price term loans on a *rollover basis*. This means that every three or six months the loan is repriced at the then-prevailing LIBOR for 3- or 6-month money plus the agreed-upon spread. For example, a one-year loan might be rolled after six months, which means that the first 6-month segment would be priced at the agreed-upon spread plus the 6-month LIBOR rate prevailing at the time the loan was granted, while the second 6-month segment would be priced at the same spread plus the 6-month LIBOR rate prevailing six months later.

RUNNING A BANK'S EUROBOOK

Running a bank's Eurodollar book boils down to much the same thing as running its domestic book. The bank must decide what assets to hold and what liabilities to use to fund them. In making these decisions, the bank faces the same *risks* it does in its domestic operations—credit risk, liquidity risk, and rate risk. In its Euro operations, as in its domestic operations, a bank's objective is to maximize profits subject to the constraint that risks are held to an acceptable level.

In a bank's Eurobook, credit risk exists both on ordinary loans and on interbank placements, which—like sales of fed funds—are unsecured loans. To control risk on ordinary loans, banks impose credit standards on borrowers as well as limits on the amount they will lend to any one borrower. On placement with other banks, credit risk is controlled, as in the case of fed funds sales, by setting up lines of credit that limit the amount the bank will lend to any other banking institution. As noted below, banks also use lines to limit what is called *country risk*.

Because most of a Eurobanker's assets and liabilities have fixed maturities, it would be possible for a Eurobanker, unlike a domestic banker, to run a *matched book*; that is, to fund every 3-month asset with 3-month money, every 6-month asset with 6-month money, and so on. If he did so, moreover, he would reduce his rate risk to zero because every asset would be financed for its duration at a locked-in positive spread. He would also minimize his liquidity risk; but he would not eliminate it, since on rollover loans he would still have to return periodically to the market to obtain new funding.

While running a matched book would reduce risk, it would also limit the bank's opportunity to earn profits in an important and traditional way: by lending long and borrowing short. Eurobankers are aware of the profit opportunities that a mismatched (*short*) book offers, and to varying degrees they all create a conscious mismatch in their Eurodollar books—one that is carefully monitored by the head office to prevent unacceptable risks. How great a maturity mismatch a given bank will permit in its Eurobook depends on various factors: the shape of the yield curve, its view on interest rates, and its perception of its own particular liquidity risk. If a bank is running a global book, the size and nature of the mismatch it wants or can tolerate in its Eurobook will depend partly on the mismatch in its domestic book.

In discussing a U.S. bank's Euro operations, it's crucial to bear in mind that the bank's foreign branches are an integral part of the bank. Thus, the same pressures for change that operate on the parent also influence its foreign branches. In particular, the diminishing of bank credits in the eyes of investors combined with the trend toward securitization have worked to narrow—in some cases to eliminate—the natural spread banks once enjoyed in Euro lending; this in turn has forced banks to look elsewhere for profits in their Euro operations—especially to noninterest income such as fees and to profitable dealing activities generated by corporate-finance-type activities. Thus, today, when a

Eurobanker talks about creating or closing up a mismatch in his book, his tools of choice are likely to be not, as in the past, cash instruments but rather off-balance sheet items: Eurodollar futures, forward rate agreements (FRAs), interest-rate swaps, credit derivatives, and option products.

THE INTERBANK PLACEMENT MARKET

The pool of funds that forms the basis for the Eurodollar market is provided by a varied cast of depositors: large corporations (domestic, foreign, and multinational), central banks and other government bodies, supranational institutions, such as the Bank for International Settlements (BIS), and oil producers. Many of these funds come in the form of *time deposits* with fixed maturities.

The banks, however, also receive substantial amounts of call money. A *call account* can be a same-day value, a 2-day notice, or a 7-day notice account. On a same-day value account, a depositor can get same-day repayment of his funds if he gets repayment instructions to his bank prior to midday London time. The going rate banks pay for call money is pretty much tied to the overnight Eurodollar rate. As market rates move, a bank will periodically change the rate it pays on call money, although these fluctuations will tend to be small in between Fed meetings, when changes to the fed funds rate are implemented. When rates move, a bank must notify its customers before noon London time. Normally, Eurobanks sell each other overnight money, not call money. Call deposits come from nonbank depositors; and bank to bank, call deposits vary a lot in amount.

The major attraction of a call deposit to the holder is liquidity. Time deposits pay more, but a penalty is incurred if such a deposit is withdrawn before maturity. From a receiving bank's point of view, call money is attractive because, with a positively sloped yield curve, such money is cheap. Also, despite its short-term nature, call money is a fairly stable source of funds, so much so that a big bank might, in running its Eurobook, feel comfortable viewing half of its call deposits as essentially long-term funds.

THE EURODOLLAR TIME-DEPOSIT MARKET

For reasons discussed below, banks receiving Eurodollar deposits frequently choose to place some portion of these deposits with other banks,

often while simultaneously taking deposits of other maturities. As a result of all this buying and selling, a huge and highly active market in interbank placements has developed. This market is worldwide. It also has a large number of participants, which reflects two facts: First, banks from countries all over the world participate in the market. Second, every one of a bank's foreign branches—many U.S., European, and Japanese banks have many such branches—participates in this market as a separate entity. Thus, for example, Citibank's foreign branches in London, Singapore, Bahrain, Grand Cayman, and elsewhere all take and place Eurodollars in their own names.

While a high proportion of total Eurodollar placements is brokered, not all such placements pass through the brokers' market. In particular, some money is sold by continental banks direct to big London bidders, with the London bidders quoting rates based on those prevailing in the brokers' market. Also, a bank branch normally won't trade with another branch of the same bank through brokers since the two communicate directly with each other. Today, banks seek more actively than they once did to maximize interbranch transactions—Citibank London buys from and sells to Citibank Hong Kong; such intrabank transactions permit each branch to meet its specific needs while conforming to the bank's objective of minimizing usage of its consolidated balance sheet.

RISKS AND LIMITS

A bank placing funds in the interbank market faces two risks. First, there is the *credit risk*, which banks seek to control through the use of credit lines. In establishing lines to foreign banks, a U.S. bank will look at the normal criteria of creditworthiness, such as size, capitalization, profitability, and reputation. In addition, a bank will be concerned about *country* or *sovereign risk*. Specifically, it will consider various factors about the bank's country of origin that might influence either the bank's viability or its ability to meet commitments denominated in a foreign currency. Of particular interest would be factors such as whether the country of origin was politically stable, whether nationalization on terms unfavorable to foreign depositors was a possibility, and whether the country's balance of payments was reasonably strong.

There's also a second aspect of sovereign risk that banks placing Eurocurrency deposits with other banks worry about. A bank selling

Eurodollars to, say, the London branch of a Japanese bank must consider not only the creditworthiness of that bank and Japanese country risk, but also the economic and political climate in London: Is it conceivable that by nationalizing foreign bank branches, freezing their assets, or some other action, the British might render it impossible for these branches to honor their commitment to repay borrowed dollars? Questions of this sort are less of a concern with respect to London than to smaller Eurocenters, such as Bahrain and Caribbean banking centers. Banks seek to limit the sovereign risk to which they are exposed by imposing country limits on their lending and interbank placements.

The administration of these limits is complex. First, two sets of limits apply: country limits and limits to individual banks. Second, for Bank A to track how much credit in the form of Eurodollar placements it has granted to Bank B, it must track the Eurodollar sales of *all* its branches to *all* of Bank B's branches. Third, at the same time that Bank A is selling Eurodollars to Bank B, it will also be granting credit to Bank B in other ways, for example, through the sale of fed funds or via letters of credit.

Most banks, because of their size, nationality, and customer base, tend to be natural net sellers or buyers of Eurodollars. However, it's important for a bank that wants to buy Eurodollars to sell them some of the time, since one way a bank gets lines from other banks is by placing deposits with them. In the Eurodollar market, as in the fed funds market, some banks have to buy their way in.

There is much more to be said about how Eurodollars are quoted and traded in the brokers' market and about arbitrage between Eurodollars and domestic dollars. These topics are covered in Chapter 18.

MEDIUM-TERM MONEY

Some banks have raised medium-term Eurodollars in London by selling floating-rate notes. Banks could also raise such money by selling Euro medium-term notes (MTNs) just as they sell deposit notes in the domestic market—and then do a swap if they want floating-rate money.

A bank, however, thinks in terms of its consolidated balance sheet. Domestic medium-term money is cheaper than Euro medium-term money, so if a bank is inclined to buy such money, the place it's likely to do so is in the domestic money market.

EURO LENDING

Today, the Eurodollar market is *the* international capital market of the world, which is greatly reflected in the mix of borrowers that go to it for loans. Their ranks include U.S. corporations funding foreign operations, foreign corporations funding foreign or domestic operations, foreign government agencies funding investment projects, and foreign governments funding development projects or general balance-of-payments deficits.

EURODOLLAR BANK LOANS

Eurodollar bank loans are priced at a spread to LIBOR. Since different banks may be offering Eurodollars at not quite the same rates, the LIBOR rate used in pricing a loan is usually the average of the 11 a.m. offering rates of several *reference banks*, which are always being top banks in the market.

How great a spread over LIBOR a borrower is charged depends on market conditions, who is borrowing, and for what purpose they are borrowing. Loans to finance leveraged buyouts (LBOs) and restructuring are typically done at a wider spread over LIBOR than for other loans.

For example, a good corporate credit might pay only 10 or 15 bp over LIBOR on a 3- to 5-year loan for general corporate purposes. It's hard to generalize because of the wide variety of loan terms and credits. Good credits get from a syndicate of banks a standby line of credit under which they may borrow at an agreed spread over LIBOR. The standby line, for which they pay a fee, may be a *multiple-option facility* (a *MOF*) or some other facility such as a note issuance facility (NIF) or a revolving underwriting facility (RUF)—Eurodollar line names resemble alphabet soup—under which they may bid to their line banks for money when they need it or when they like the market (see Chapters 22 and 24). The advantages to a borrower of getting money using a bid-option facility are flexibility and spreads lower than what it could get on a term loan. A bank asked to bid under a MOF will bid aggressively if the loan fits its book, less aggressively or not at all if the loan doesn't fit its book.

On rollover loans, which make up a large portion of Eurodollar loans, the bank normally allows the borrower to choose whether to take 3- or 6-month money each time a rollover date occurs. Banks will also grant a 1-year rollover option to good customers but will try to discourage the inclusion of this option in loan agreements because to match fund

maturities beyond six months can be difficult because of the thinness of the market in longer-term deposits. What choice of maturity the borrower makes on a rollover date depends on whether he expects interest rates to rise or fall.

The bank may, at the borrower's request, also include in a rollover loan agreement a *multicurrency clause* that permits the borrower to switch from one currency to another—say from dollars to yen—on a rollover date. Multicurrency clauses usually stipulate that nondollar funds will be made available to the borrower conditional upon “availability.” This clause protects a bank from exchange controls and other factors that might dry up the market and prohibit the bank from acquiring the desired funds, even in the foreign exchange market.

While fixed-rate, fixed-term loans do occur in the Eurodollar market, they are uncommon. Banks are generally unwilling to make them unless they match fund, a policy that makes such loans so expensive that the borrower is likely to conclude that its funding cost over the life of the loan would be less with a rollover loan. Also, a prime borrower willing to pay up to lock in a fixed borrowing rate is likely to find a Eurobond issue cheaper than a fixed-rate loan. On the other hand, a lesser credit wanting term, fixed-rate financing will probably find that its cheapest route is to borrow variable-rated money from a bank and simultaneously couple that borrowing with an interest-rate swap, variable for fixed rate (see Chapter 19).

Often, term loans extended to finance capital projects have an *availability period* during which the borrower receives funds according to some prearranged schedule based on his anticipated needs. The availability period may be followed by a grace period during which no repayment of principal is required. After that, the normal procedure is for the loan to be amortized over its remaining life. Some *bullet loans* (loans with a lump sum paid at the end of their term) with no amortization are granted, but they are the exception not the rule.

On Eurodollar loans, the standard practice is often to disallow prepayment, but some agreements do permit it on rollover dates with or sometimes without payment of a penalty. To gain greater flexibility, the borrower can negotiate a *revolving facility*, which permits him during the life of the loan agreement to take down funds, repay them, and take them down again as he chooses.

The fact that Eurodollar loans are made to borrowers all over the world could create considerable legal complications for lenders, especially

in the case of default. To minimize these, Eurodollar loan agreements generally specify that the loan is subject to either U.S. or British law.

Many Eurodollar loans granted to U.S. corporations by U.S. banks are negotiated at the bank's head office in the United States. This is most likely to occur if the loan is granted to a foreign subsidiary (sub) that is kept financially anemic because it is operating in a weak-currency country or if management of the overall firm is strongly centralized. If, on the other hand, the sub is financially strong and its management is largely autonomous, negotiation for a Eurodollar loan will occur abroad, frequently in London because the expertise is there.

SYNDICATED LOANS

On corporate loans for big projects (e.g., oil development projects), the amount required might exceed a bank's legal lending limit, or the bank might choose not to go to that limit in the interests of diversification of risk. On country loans, no bank can write the loans alone. Country loans are often for huge amounts because certain borrowers, especially underdeveloped countries, are financing big development projects. Other countries with substantial borrowing needs require funds to finance their balance of payments deficits.

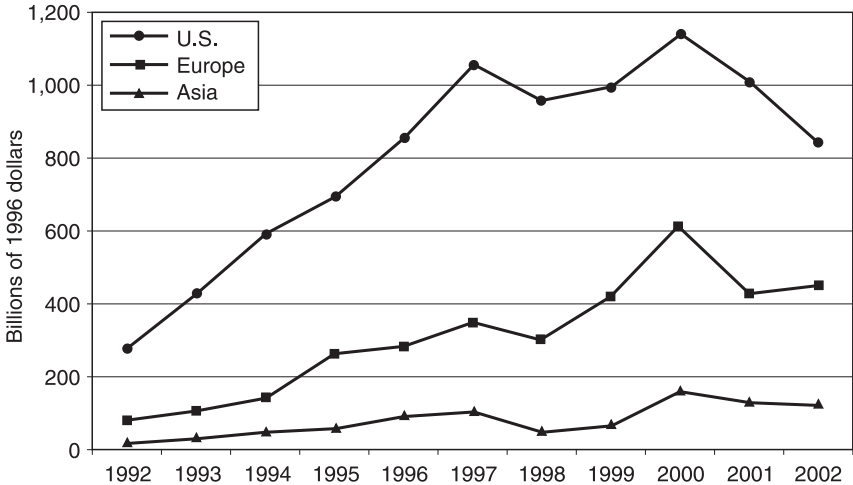
As with other forms of borrowing, syndicated loans tend to be correlated with economic activity. This is illustrated in Figure 7.12 by the flattening of activity that occurred just prior to the onset of the U.S. recession in 2001. A sovereign that has good access to the Eurobond market but wants floating-rate money can today easily get the money by coupling its bond issue with an interest-rate swap, and probably it can end up with sub-LIBOR funding to boot.

In other instances, syndicated loan volume has been affected by shifts toward the Eurobond market when credit spreads have narrowed. Most syndicated loans are priced off a spread to LIBOR, although EURIBOR, the interbank offering rate for the euro, and TIBOR, the Tokyo Interbank Offering Rate, are also used.

Latin American and other emerging market sovereigns have also been big borrowers in the syndicated loan market, but poor credit history of some of these nations has curbed volume. In recent years, the biggest borrowers in the emerging markets have been Middle Eastern and African entities (Figure 7.13).

FIGURE 7.12

Issuance volume in the major syndicated loan markets is affected by economic conditions



Note: For purposes of the graph, loans issued in currencies other than dollars are converted to U.S. dollar amounts in Loanware using exchange rates on or near the loan contract date. Such amounts are then converted to 1996 constant dollars using the GDP deflator. Face amounts of loan commitments are used; that is, undrawn commitments are included in totals.

Sources: Federal Reserve, Loanware

Like top sovereigns, good corporates have found over time that syndicated loans are less attractive compared to issuing securities. Nevertheless, they have remained active, as evidenced by the heavy volume statistics for Europe and the United States.

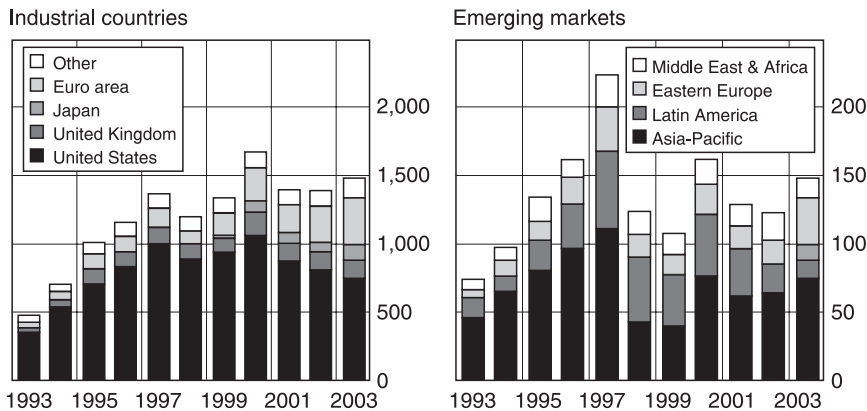
On the whole, syndicated loan volume grew sharply in the 1990s, particularly beginning in 1994. By 2003, the total amount of new syndicated loans had increased to \$1.6 trillion, three times as much as 10 years earlier (Figure 7.14).¹¹

A lot of syndicated lending today is done by big corporates in industrialized countries. Often, the loans are related to LBOs, restructurings, and acquisitions of other companies. On such loans, speed and size, both

¹¹ Blaise Gadanecz, "The Syndicated Loan Market: Structure, Development, and Implications," Bank for International Settlements, *Quarterly Review*, December 2004.

FIGURE 7.13

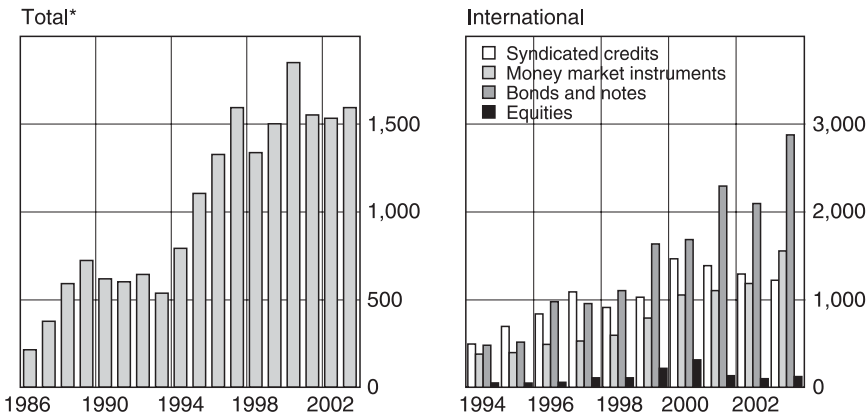
Syndicated lending by nationality of borrower
(gross signings, in billions of U.S. dollars)



Sources: Bank for International Settlements, Dealogic Loanware

FIGURE 7.14

Syndicated lending since the 1980s (gross signings,
in billions of U.S. dollars)



* Of international and domestic syndicated credit facilities.

Sources: Bank for International Settlements, Dealogic Loanware, Euromoney

of which banks can provide, are of the essence. Also, such borrowing is usually based on a quite detailed story by the borrower; the securities market is not the best place for that, especially the Eurobond market in which investors want quality and simplicity.

Some of the above borrowing is what's called *mezzanine finance*. A borrower has gotten its deal together and needs temporary financing to tide it over while it sells assets, reorganizes operations, or whatever the borrower plans to do before it goes public. Mezzanine finance usually pays a premium above the rate on lower-rated bonds. Also, the borrower can acquire mezzanine finance any way it wants—in any one of various and funny forms, ranging from preferred stock issues to a loan with an equity kicker in the form of options on the borrower's stock.

The credit quality of syndicated loan borrowers is of course mostly investment-grade, although the percentage of speculative-grade credits tends to be larger in the United States than in Europe, as shown in Table 7.9.

Mechanics and Fees

Big Euro loan syndication agreements are negotiated in London. Often the lead bank is a top U.S. bank, but big European banks have become more

TABLE 7.9

Distribution of syndicated loan borrowers during the period 1992–2002

Rating	Market	
	United States	European
Investment grade (%)	73	88
AAA and AA	9	19
A	35	43
BBB	28	25
Speculative grade (%)	27	12
BB	14	7
B	12	6
Less than B	1	0
Memo: Percent of total volume by unrated borrowers	66	40

Source: Federal Reserve

aggressive in this area. While many of the banks that participate in a typical Euro syndication are based in London, it isn't uncommon for continental banks and even domestic U.S. banks with no London branch to take a piece of such loans. Doing so may provide them with both a good rate and a chance to diversify their assets.

Loan syndication normally starts with the borrower accepting the loan terms proposed by a bank and giving that bank a mandate to put together a credit for it. Most such agreements are on a *fully underwritten basis*, which means that the lead bank guarantees the borrower that he will get all the money stipulated in the loan proposal.

Since the amount guaranteed is more than the lead bank could come up with alone, it selects *comanagers* that help it underwrite the loan. Once the lead bank and the comanagers have split up the loan into shares, they have about two weeks to sell off whatever portion of their underwriting share they do not want to take into their portfolio. At the end of this selling period, the lead bank advises the borrower as to what banks have participated in the syndication. Then the borrower and these banks attend a closing at which the final loan agreement is signed. Two days later, the borrower gets his money. From the viewpoint of the lender, participation in a syndicated loan carries a commitment to lend for the life of the loan, since such participations are rarely sold by one bank to another. Figure 7.15 provides an example of how a syndicate is structured.

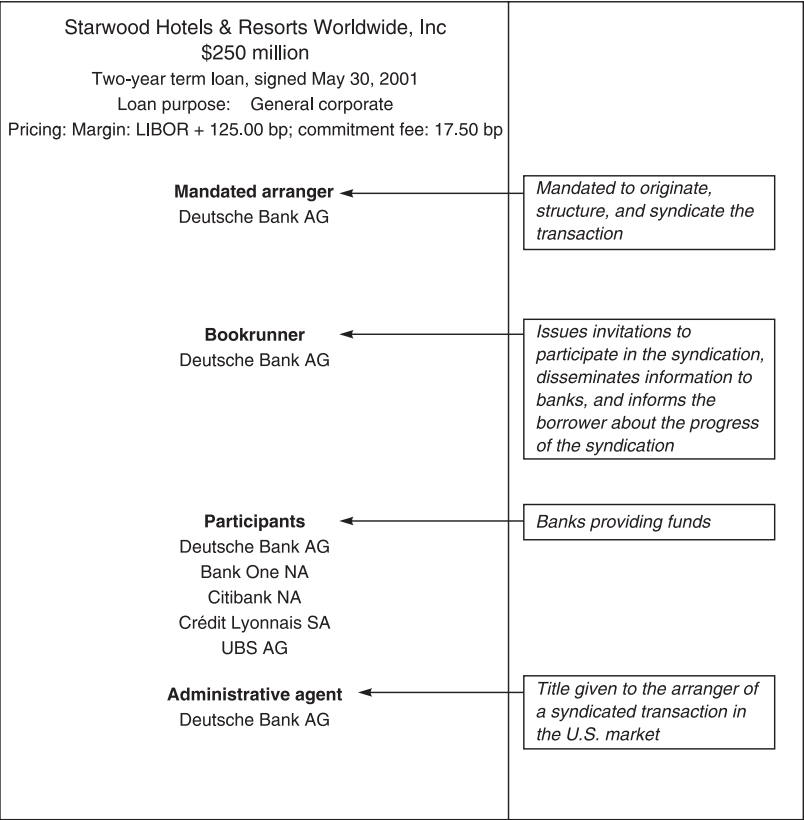
Various fees are charged on a loan syndication. The underwriters receive a fee for putting the syndicate together and for guaranteeing the availability of funds. There are also participation fees earned by parties that agree to join the lending facility. The fee in this instance depends upon the amount of the participant's monetary commitment. Those with the smallest commitment, the junior members, generally do not receive a fee; rather, they earn the spread over the reference yield. Table 7.10 and Figure 7.16 provide additional insights into the fee structure for syndicates.

Merchant Banks

While loan syndication can be done directly by a bank, it has been common for large U.S. banks to do syndicated lending out of separate merchant banking subsidiaries. Loans are also syndicated by consortium banks, that is, by banks set up and jointly owned by several banks, frequently of different nationalities.

FIGURE 7.15

Example of a simple syndicate structure: Starwood



Source: Bank for International Settlements, Dealogic

Although not defined in U.S. federal banking and securities laws, the term *merchant banking* is generally understood to mean negotiated private equity investment by financial institutions in the unregistered securities of either privately or publicly held companies.¹² Investment banks and commercial banks both engage in merchant banking, generally investing

¹² Valentine V. Craig, “Merchant Banking, Past and Present,” Federal Deposit Insurance Corporation, *FDIC Banking Review*, June 2002.

TABLE 7.10

Structure of fees in a syndicated loan

Fee	Type	Remarks
Arrangement fee	Front end	Also called <i>praecipium</i> ; received and retained by the lead arrangers in return for putting the deal together
Legal fee	Front end	Remuneration of the legal advisor
Underwriting fee	Front end	Price of the commitment to obtain financing during the first level of syndication
Participation fee	Front end	Received by the senior participants
Facility fee	Per annum	Payable to banks in return for providing the facility, whether it is used or not
Commitment fee	Per annum, charged on undrawn part	Paid as long as the facility is not used, to compensate the lender for tying up the capital corresponding to the commitment
Utilization fee	Per annum, charged on drawn part	Boosts the lender's yield; enables the borrower to announce a lower spread to the market than what is actually being paid, as the utilization fee does not always need to be publicized
Agency fee	Per annum	Remuneration of the agent bank's services
Conduit fee	Front end	Remuneration of the <i>conduit bank</i> *
Prepayment fee	One-off if prepayment	Penalty for prepayment

*The institution through which payments are channeled with a view to avoiding payment of withholding tax. Once important consideration for borrowers consenting to their loans being traded on the secondary market is avoiding withholding tax in the country where the acquirer of the loan is domiciled.

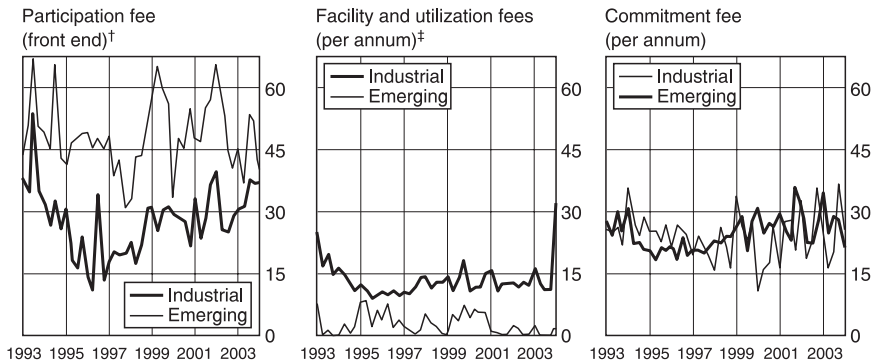
Source: Blaise Gadanez, "The Syndicated Loan Market: Structure, Development, and Implications." Bank for International Settlements, *Quarterly Review*, December 2004.

in common stock, and most private equity funding generated by these entities is used for either start-ups or early-stage companies, or to bring large public companies private. In the early 2000s, this was a trend that was particularly evident.

Private equity financing is used as an alternative to public offerings, debt offerings, and the arranging of a private placement of debt or a bank loan. Craig (2002) cites a number of reasons that companies seek

FIGURE 7.16

Breakdown of fees for syndicated loan borrowings (in basis points)*



* Quarterly averages weighted by facility amounts.

† Not annualized.

‡ Industrialized country borrowers only.

Sources: Bank for International Settlements, Dealogic Loanware

private equity financing. For example, other forms of financing may be unavailable or too expensive because the company's track record is either nonexistent or poor (that is, the company is in financial distress). Or a private company may want to expand or change its ownership but not go public. Or a firm may not want to take on the fixed cost of debt financing.

Public firms may seek private equity financing when their capital needs are very limited and do not warrant the expense, time, and regulatory paperwork required for a public issue. They also may seek private equity to keep a planned acquisition confidential or to avoid other public disclosures. They may use the private equity market because the public market for new issues in general is bad or because the public equity market is temporarily unimpressed with their industry's prospects. Finally, very often in recent years, managers of large public firms have felt their firms will benefit from a change in capital structure and ownership and will choose to go private by means of a leveraged buyout.

Craig (2002) finds that 80% of private equity investments are made by limited partnerships, with professional private equity managers acting on behalf of institutional investors. In limited partnerships,

which tend to have a contractually fixed life of around 10 years, the professional equity managers serve as general partners, and the institutional investors serve as limited partners. The general partners manage the investment and contribute an insignificant part of the investment, generally approximately 1%. Investments in these limited partnerships are illiquid, and investment returns are not expected to be reaped for many years after the formation of a partnership when the business is sold through an IPO or private sale, or the shares are repurchased by the company.

The enactment of Gramm-Leach-Bliley in 1999 created new opportunities for merchant banks that were previously restricted under Glass-Steagall. The act specifically recognizes merchant banking as an activity “financial in nature,” granting authority to financial holding companies (FHCs) to provide merchant banking services, although the legislation does not define merchant banking. The new law allows FHCs to “directly or indirectly acquire or control any kind of ownership interest in an entity engaged in any kind of trade or business whatsoever” if (1) the shares are purchased and held through a securities affiliate or “an affiliate thereof” of the FHC; (2) the shares are held for the sole purpose of appreciation and ultimate resale; and (3) the FHC does not routinely manage the company in which it has invested except as necessary to obtain an ultimate reasonable return on investment.

Although Gramm-Leach-Bliley has leveled the playing field a bit, British law allows British banks to engage in a much wider range of activities than a U.S. bank may. There has, however, tended to be some degree of specialization between different British banks. In particular, the so-called merchant banks have specialized primarily in providing not loans of their own funds, but various financial services to their customers. These include accepting bills arising out of trade, underwriting new stock and bond issues, and advising corporate customers on acquisitions, mergers, foreign expansion, and portfolio management. One reason why top U.S. banks have opened merchant banking arms in London is that these subs could engage in activities, such as bond underwriting, that the branch itself could not because of Glass-Steagall.

Consortium Banks

A number of U.S. banks, in addition to or instead of setting up a merchant banking subsidiary, have joined with other banks to form consortium banks.

These carry out many of the same activities as their merchant banking subs do. The objectives of U.S. banks in joining such groups have been mixed, depending on the size and experience of the bank. Some smaller banks join to be able to participate in medium-term Eurodollar financings. Other banks join to gain experience in international financial markets in general, in specific geographic markets, or in new lines of business. Consortia formed by large banks provide a large standing capability for syndicating loans, and these institutions are active in this area.

THE EUROBOND MARKET

During the 1990s, the Eurobond market grew at a fast pace, with the total amount outstanding at the end of the decade close to \$1 trillion. Typical new issues rising are several hundred million dollars in size, and there tend to be over 20 underwriters in the syndicate group. Some of the growth of the Eurobond market reflects the fact that, for many borrowers who would previously have done syndicated loans, the funding vehicle of choice had become a Eurobond issue. Innovation has played a role, with Eurobonds of all flavors having been introduced, including floating-rate and equity-linked securities, for example. Eurobond offerings are denominated in many currencies, although the dollar remains the currency of choice, accounting for about 45% of all Eurobond issuance in the late 1990s.¹³ Corporate borrowers account for about two-thirds of the Eurobond market, and government borrowers account for close to a quarter of issuers. The rest is issued by international agencies such as the World Bank.

Deciding just how to structure a borrowing via the issuance of securities involves important and complex questions. Thus, borrowers often turn to investment banks or to the merchant banking subs of big banks for advice. “In doing a borrowing,” noted one U.S. merchant banker, “the choice between one instrument and another may save an issuer 3 bp. What really makes a difference is whether an issuer chooses fixed or floating—whether, if he locks in a fixed rate, he chooses the right moment to do so. This second decision may save him tens of basis points. A third decision concerns the currency in which to denominate the issue. A right choice on

¹³ Arie Melnik and Doron Nissim, “Debt Issue Costs and Issue Characteristics in the Eurobond Market,” International Centre for Economic Research, *Working Paper Series*, March 2003.

that question can save an issuer hundreds of basis points. When we are asked to help as an advisor as well as with execution, we start first with the currency decision because it is the most important decision the issuer makes. He needs funds: Does he borrow yen, euros, dollars, or whatever?

“Governments, when they borrow, are likely to be open about making a currency decision if we show them that by doing so they can lower their all-in cost of borrowing. Some sovereigns are used to borrowing in a lot of different currencies, because they couldn’t just borrow in their own even if they wanted to [because the market would not absorb the debt]. Corporates, in contrast, are more difficult. They do not like to make currency decisions. They have certain exposures in certain currencies, and they tend to borrow what they need to cover those cash flows.”

The Mechanics

Doing a Eurobond issue somewhat resembles doing a syndicated loan. The issuer awards a mandate to the lead manager; and the issuer and the lead manager agree on the fees, maturity, payment dates, and format of the issue. The front-end fees vary depending upon the issuer, maturity length, size of the issue, and market conditions. The lead manager collects the fee and distributes it among the underwriters.

A key feature of the Eurobond market is that total issuance costs tend to be below that of ordinary corporate bonds. This might reflect the fact that the credit quality of Eurobond issues tends to be very good. Another factor reflects the fact that Eurobond issues tend to have shorter maturities than do domestic issues, which reduces the interest-rate risk associated with the issuance. The issuer’s tax considerations also play a role.

Melnik and Nissim (2003) investigated the determinants of three components of issue costs: underwriter fee, underwriter spread (the difference between the offering price and the guaranteed price to the issuer), and underpricing (the difference between the market price and the offering price). They found that the issue costs in the Eurobond market are only 0.37% of the issue price, a low tally compared to the market for large domestic issuance, which can run as high as 2% of the issue price. An interesting observation was the finding that the 0.37% cost of issuance resulted from a standard underwriting fee of 1.03% minus a negative underwriter spread of 0.66%. Negative underwriting spreads occur when the underwriters set the price guaranteed to the issuer above that of the

offering price. One possible explanation for this pricing structure, Melnik and Nissim write, is that, “Issuers prefer high fee and low spread for income tax purposes. The spread affects the issuer’s taxable income by changing the effective interest rate used in calculating the periodic interest deductions from taxable income (the effective interest rate is calculated using the guaranteed price). Thus, the tax consequences of the spread are distributed over the bond’s life. To the extent that issuers are able to accelerate the deduction of the fee for income tax purposes, they would prefer high fee and low spread. Underwriters, on the other hand, recognize both compensation components as income in the current year, so they are indifferent to the composition.”

In terms of additional mechanics to Eurobond issuance, the lead manager goes out and syndicates the deal with banks and other market makers, allocating each a certain number of bonds to place. Then, the issue trades in the *gray* market. This important market resembles the *WI* market in U.S. Treasuries. Deals are priced at less than full fees. So, if a manager brings a Eurobond at 40 over Treasuries, it is 40 over including full fees; that is, it is not 40 over par, but 40 over at, say, 98%. That is where the issue starts trading.

The gray market tells the issuer and the lead manager what the secondary market thinks a new issue is worth; where it should trade relative to existing paper. Traders in the gray market sell short an issue at the level at which they think they will be able to cover. A lead manager can take exception and *ramp* (take control of) a new issue, restrict his allocations, and say, “Now, you guys who have sold at par less 1½, I have allocated nothing to you; so when you want to cover your short, you will have to come to me; and my offering price is going to be less a half.” This has been done sometimes with, sometimes without, success. It depends on how big the issue is and on how strong the selling group is. It takes only a few members of the group to crack, and the gray market gets its paper.

Competition to underwrite Eurobond issues is cutthroat, which is apparent in the large number of underwriters that tend to be part of the underwriting group, especially in today’s global market.

The Investors

The traditional Eurobond investor bought and held institutions. The underwriters hold only a small amount of the bonds and sell most of the rest to smaller banks and many nonbank investors, such as insurance companies, mutual funds, pension funds, and corporations.

Often, their money is managed by professionals, pitted in competition against one another; and if one guy has a tremendous pickup in Latin American bonds because the currencies there have appreciated, that doesn't go unnoticed by his peers, creating a herd mentality of sorts that pushes money toward a particular currency or region of the globe. A lot of U.S. investors wanting to achieve currency diversification have given money to merchant banks because these banks have the expertise to run nondollar portfolios, since they've been doing it for a long time. The U.S. investor wanting to get into Latin America, says, "What do I buy?" The merchant banks know the instruments in the market probably better than the investor does.

Banks trade foreign exchange, so it's natural for them to have a view on foreign-exchange rates. Also, they have branches in centers around the globe, so they're in a position to have an informed view not just on the level of German or U.K. interest rates, but on the domestic yield curves in the country in question. So big U.S. banks have come to run opportunistic portfolios in gilts, bunds, Japanese government bonds (JGBs), and other nondollar bonds as naturally as they run portfolios in Treasuries. To fund such portfolios, these banks can swap dollars for foreign exchange or they can source local currencies via their local branches.

Needless to say, the merchant banking subs of U.S. banks are very active in underwriting new Eurobond issues and in providing swaps, cross currency, and fixed floating. In part, what the fight against Glass-Steagall was all about was U.S. banks saying, "We want the right to do in the United States what we've been doing successfully in London for years."

RUNNING A EURODOLLAR BOOK

In running their Eurodollar books, the big U.S. banks have taken decades to develop strategies that are sophisticated and with which they feel comfortable. One reason is that the top executives of money market banks were often people with little experience in international business. Also during the early years of the Eurodollar market, no one really understood it or knew where it was going. Gradually, market expertise developed in London, but that spread only slowly across the Atlantic. Thus, when the London branches of the big U.S. banks began running dollar books, the edict went out from the home office that asset and liability maturities were to be matched to minimize rate and liquidity risks.

Learning to Gap

U.S. banks became willing to mismatch their Eurodollar books aggressively to increase profits in the 1970s. Today, all the major U.S. banks have several foreign branches running Eurodollar books, so their overall exposure to risk in the Eurodollar market is the sum of the risks associated with several separate branch books. With respect to liability management, the head office's main concern is with the rate and liquidity risks that are created through the mismatch of the bank's consolidated Eurodollar position. To control these, management sets up guidelines within which each branch is supposed to operate.

There is no precise way to compare the risk associated with funding, say, a 3-month loan with overnight money versus lending 6-month money and funding the first four months with 4-month money. So head office guidelines take arbitrary and quite different forms. Their purpose, however, is always the same: to limit the mismatch a branch may make.

Eurodollar bankers often refer to the practice of lending long and borrowing short as *running an open book*. The head office might, for example, control the mismatch on a branch's book by setting limits on the open positions that the branch could assume beyond two months, four months, and six months. An alternative approach is to apply different weights to the mismatches in different maturity ranges (larger weights, the longer the maturity range) and then require that the weighted sum of all mismatches be less than some dollar figure.

The job of operating the branch's book under these guidelines falls to local funding officers. In the London branch of a large U.S. bank, there will be several senior people responsible for making overall policy decisions and a number of dealers under them who actually buy and sell money. Much of the work of the senior people involves formulating a view on what's likely to happen to interest rates and then deciding, in light of that view and current market conditions, what strategies to follow in taking and placing deposits.

If a Eurodollar banker expects interest rates to stay steady or fall, he will lend long and borrow short, that is, run a *short* book, assuming a positively shaped yield curve. How short depends in part on the slope of the yield curve. As one banker noted, "There's no incentive to take money at call and put it out for three or six months for a $\frac{3}{16}$ or $\frac{5}{16}$ spread. With a flat yield curve like that, you are taking a tremendous risk for little reward; if rates back up, you are left with a negative carry. But when the yield curve

is steep—a 1% spread between call and 1-year rates—there is a real incentive to overlend and take the spread.”

When interest rates are volatile, banks impose much tighter limits on the mismatch positions branch treasuries can assume. Also, there is a tendency for banks to globalize their world book which led to a situation in which the head offices of a number of banks began dictating to their branches the positions the branches should run.

Once a decision about the maturity structure of the branch's assets and liabilities is made, the responsibility for implementing this decision falls on the chief dealer and his assistants. The London dealing room of a large bank is a fascinating and busy place, populated during trading hours by a bevy of time-deposit and foreign-exchange traders engaged in rapid-fire, nonstop conversations with brokers and large customers.

The “book” that is thrust into the chief dealer's care contains data giving the current amounts and maturities of all the branch's assets and liabilities. The salient features of this book are something a good dealer keeps in his head—the mismatch in different maturities, the amounts of funds he is likely to have to buy or sell in coming days, and when and in what maturity range interest rate pressures might develop from big rollovers. On the basis of this information, the overall guidelines established for the branch, and the strategies set by local funding officers, the dealer's job is to do the necessary taking and placing of funds as profitably as possible. This sounds simple but leaves much room for the exercise of tactics and judgment.

On every Eurodollar loan a bank makes and funds, it has three potential sources of profit. First, there is the spread the bank gets over LIBOR, which compensates it for operating expenses and the credit risk it is assuming. Second, there is the extra $\frac{1}{16}$ or $\frac{1}{8}\%$ that the bank may be able to make if its dealers can pick up the needed funds a little below LIBOR, for example, through astute timing of the purchase. A third way a bank can profit from a loan is through mismatching its book.

Eurodollar bankers take time deposits from two main sources: bank customers (including foreign official accounts and central banks) and the interbank market. A major bank branch in London will have several people whose job is to contact big depositors, such as major corporate customers (e.g., the oil companies), certain central banks, and other big depositors. Unlike the time-deposit dealers, these customer representatives have more time to chat with depositors, whether by instant message, phone, or e-mail, about market conditions and rates. The banks like to pick up money this

way, since it saves them brokerage fees. Also at times, such money may be cheaper than what they could pick up in the interbank market. That depends on the sophistication of the depositor.

Banks that are large takers of funds also try to cultivate direct relationships with other banks. Banks, unlike corporations, can go into the brokers' market to place Eurodollars. Thus, a bank attempting to pick up money directly from other banks to save brokerage fees normally tries to post fair bid rates for different maturities and to suggest indirectly at least that sellers go elsewhere on days when it is posting noncompetitive rates because it does not need money. A major bank that posts noncompetitive rates may still pick up deposits either because the lender has lines to only a few banks or because his lines to other banks are full.

While large banks prefer to get money directly to save brokerage fees, brokers are extremely useful to them. Although brokers have to be paid, they save banks money on both communications and personnel. The brokers are also useful to a bank that suddenly discovers it has an hour to raise \$800 million of short-dated funds, an amount that might take some time to dig out directly. A third advantage the brokers offer is the cloak of anonymity. As a funding officer at the London branch of one of the largest U.S. banks put it, "Suppose I want to sell \$400 million and I call a bank direct, one who would have been prepared to do that transaction in the brokers' market. He sees that it is my bank on the other side, and he gets nervous and wonders—what are they trying to do, \$150 million or \$500 million? So he does a \$75 million deal, and now not only have I not done the transaction, but I have disclosed the amount I am trying to do." Anonymity in this respect is useful for all the top banks. They are a bit like bulls in a barnyard; whenever they move, their smaller companions get nervous.

THE ROLE OF EURODOLLAR CDs

In the Eurodollar market, a banker can obtain time deposits in a wide range of maturities either directly from nonbank depositors or in the interbank market. Because of the availability of time-deposit money, a bank will issue Eurodollar CDs only if there is a rate advantage in doing so. Also, because the overall market for Eurodollar CDs is thin and the market for any one bank's CDs is thinner still, a bank is cautious about the quantity of Eurodollar CDs it writes: it wants to preserve the spread

between the rates it pays for time-deposit and CD money. Banks with big retail bases simply find that they need to buy less wholesale money.

THE EURODOLLAR PLACEMENT BOOK

One of the curious things about the Euromarket, at least to the uninitiated, is that many market participants are busily taking deposits with the right hand and placing them with the left. In the beginning, interbank placements may have been made partly out of a concern for balance sheet cosmetics. In domestic operations, it's not considered proper for a bank to loan out all the funds it takes in, the idea being that this would leave the bank with no bonds to sell and thus with a potential liquidity problem. For a money market bank, this notion makes little sense, but no U.S. bank, big or small, is going to get caught with no securities on its balance sheet. In their Eurodollar operations, banks at one time held few salable securities unless they ran a Eurodollar CD portfolio. Thus, especially in the early days of the Eurodollar market when matched funding was the rule, a book wherein all assets were loans would have been logical and would have posed no liquidity threat. It would, however, have looked bad according to the traditional criteria of bank management. Placements, which are not classed as loans but can be just as illiquid, do not present this difficulty. Thus, cosmetic considerations were one incentive for Eurodollar placements. Once banks became willing to mismatch, *profits* became another incentive.

A domestic bank that has a strong view on where interest rates are going is hard put to place a big bet based on that view. If it expects interest rates to fall, there is no interbank market in which it can sell long-dated money in volume, and since a savvy corporate treasurer is likely to have the same interest-rate view that the bank does, he will be unwilling to take out a fixed-rate term loan at such a time. If alternatively a domestic banker expects rates to rise, he will want to buy long-dated money, but he has no place where he can do this in volume. Whatever his expectations, his options for structuring maturities are limited.

In the Eurodollar market, things are different. A bank can't order its customers to take fixed-rate term loans whenever it would like them to, but in the placement market a bank can buy and sell funds in high volumes over a wide range of maturities. There are several reasons for the contrast in maturity options between the U.S. market and the Eurodollar market.

First, the Eurodollar market is traditionally more accustomed to dealing in longer dates. On the deposit side in particular, there have always been some suppliers of funds who were concerned primarily with preservation and safety of principal as opposed to maximizing return and were willing for a spread to supply long-dated funds to creditworthy banks. The ranks of such depositors were joined over the years by oil-rich nations that were willing to offer top banks deposits with maturities as long as five years to stockpile oil income earmarked to finance later investment projects. Today, the abundance of Asian dollar holdings has added to the stockpile.

The contrast in maturity options between the U.S. market and Eurodollar market also reflects differences in the positions of banks operating outside of the United States. The natural customer base of a foreign bank, for example, will include firms that lack the same access to dollar financing that U.S. firms have in the domestic capital market and that therefore may choose to borrow on terms different from those on which a large U.S. corporation would. Also, because the dollar is not their domestic currency, foreign banks are and should be more anxious to match funds than U.S. banks are. Smaller regional U.S. banks are in a somewhat similar position to foreign banks; they lack the assurance that, say, Citibank or JPMorgan has that they will be able to buy whatever money they need whenever they need it. Liquidity considerations are a final reason that a foreign bank might want to buy long-dated funds, whereas a top U.S. bank would not.

Placements are generally less profitable than loans because they offer no built-in spread over LIBOR. But because of the maturity options in the placement market, at times placements offer attractive possibilities for speculating on interest-rate changes. Assuming a positively sloped yield curve, such speculation is more attractive when interest rates are expected to fall than when they are expected to rise. A bank that expects interest rates to fall will lend long and borrow short. In doing so, it gets paid for taking a view (the spread between the long lending rate and the lower short borrowing rate), *and* if the bank is right, it earns something extra as the borrowing rate falls.

Alternatively, if a bank expects rates to rise, the natural strategy is for it to lend short and borrow long. Doing so, however, will cost the bank money, so it will come out ahead only if it is right and rates do rise sharply. Some banks, when they expect rates to rise, will, instead of borrowing long and lending short, continue the pattern of lending long and funding short.

Or they will fund in a barbell fashion, taking both short and long (6-month and over) deposits. The success of this strategy depends on the speed and extent of the rate rise. Studies have shown that, during a period of rising rates, the barbell strategy often provides funds at the cheapest cost because rates do not rise quickly or sharply enough to offset the advantages of the cheap short-dated funds used.

Petrodollars: The Latest Round

In the Eurodollar market, the top U.S. banks—because of their size, reputation, and customer base—have always been the recipients of large deposits from nonbank depositors. Both because they could earn profits by laying off such deposits in the interbank market and because the maturity structure of the deposits they received was not necessarily what they desired for their Eurodollar book, these banks became big sellers as well as takers of funds. In effect, they came to act as dealers in Eurodollar deposits.

After the Organization of Petroleum Exporting Countries (OPEC) dramatically increased the price of oil in 1974, the dealer banks rapidly became recipients of huge short-term deposits from Arab oil sellers. As they assumed responsibility for recycling of these so-called *petrodollars*, their balance sheets changed dramatically, with placements becoming much more important than they previously were relative to loans.

Their new role as recyclers of petrodollars created problems for the big banks. One concerned liquidity; in taking a lot of short-term money from oil producers, particularly the members of OPEC, these banks were violating two basic rules of liability management: (1) a bank should not take a significant portion of its deposits from a single depositor or group of depositors, and (2) a bank should not accept big deposits of volatile short-term (*hot*) money. The one comfort that the big banks could take in this matter was that, regardless of what the oil producers did with their dollars, these dollars could not disappear from the system. If oil producers pulled a lot of money out of one bank, that bank could certainly buy back the lost dollars in the interbank market from the bank or banks in which the oil producers subsequently redeposited their dollars.

A second problem created by the big deposits from oil producers was credit risk. By taking huge deposits of Middle Eastern money and redepositing it with other banks, the dealer banks were forced to assume a credit risk that they thought properly belonged to the original depositor. To compensate for this risk, the dealer banks attempted to buy Arab oil

money as cheaply as possible, a policy the Arab oil producers seemed to understand. A final problem for a bank receiving big deposits was that the resulting multibillion dollar increase in deposits and redeposits on its balance sheet tended to perceptibly erode the bank's capital ratios. Such erosion was something that a big bank might willingly have accepted to increase bread-and-butter loan business but not to earn a small margin in the placement market. To cope with these problems, a few big banks sought to limit the size of their Eurodollar book, a policy that offered the side benefit of enabling them to buy money more cheaply than other banks could.

Over time, the problems created by petrodollars eased, partly because oil producers gradually became more willing to place funds with the bottom end of the triple-A banks and the top end of the double-A banks. Whereas, in the late 1970s, 10 or 15 banks were receiving the bulk of Arab deposits, the list expanded eventually to 50 or 60 banks, and it comprised more non-U.S. names. In addition to expanding the number of banks with which they were willing to place money, Arab oil producers also became more willing to give top banks longer-term deposits, out to as long as five years.

Eventually, the problems associated with recycling petrodollars diminished, particularly when the price of oil, and hence the receipt of dollars, fell. In addition, the expenditures of these countries rose because of huge development programs they had undertaken on the basis of anticipated oil revenues, turning surpluses into deficits that stayed high until the early 2000s.

One fact that seems to surprise many people is that, as the Arab oil producers acquired so many dollars, the Middle East did not expand into a major Eurodollar center. Bahrain is primarily a booking center funded to a significant degree out of London. Part of the explanation is that the Middle East has always been viewed as an area of political instability, so even people there prefer to keep their funds elsewhere.

Where the Petrodollars Have Gone

Where have all the petrodollars gone? Given recent price levels for oil and in light of the fact that oil transactions are conducted in dollars, one would expect that more of these dollars might find their way back into dollar-denominated assets, particularly from oil-exporting nations such as those in OPEC. Key data indicate, however, that until very recently, relatively few of these dollars flowed back into dollar assets outside of these countries

in the aftermath of the initial surge in energy prices and that OPEC in particular has been shunning U.S. Treasuries.

There are many reasons for this seeming paradox, some of which relate to the individual financial needs of the respective oil-exporting countries as well as their long-term planning strategies. Nevertheless, there could well be political considerations behind OPEC's apparent reluctance to invest in U.S. financial assets.

Looking Back

The term *petrodollars* was coined decades ago, of course, and it was used frequently during the late 1970s and early 1980s to describe those dollars flowing back into the global economy from oil-producing nations. Substantial sums of money eventually flowed back into the world financial system, buoying lending activity worldwide, particularly in developing countries in Latin America, especially Mexico, Brazil, and Argentina. Borrowings by these countries led to many debt problems in Latin America, which have only recently begun to diminish somewhat.

Dollars Are Flowing to Oil Exporters

Oil-exporting nations are obviously generating large amounts of money these days, resulting in large current account surpluses. The International Monetary Fund (IMF) estimates that the oil-exporting countries in the Middle East generated roughly \$400 billion in oil export revenues in 2005, up from about \$100 billion in 1999. The IMF also estimates that these countries generated current account surpluses totaling roughly \$200 billion, equal to about 21% of their collective gross domestic product.

The internal balances of oil-producing nations are also overflowing. Saudi Arabia, for example, ran a large budget surplus of \$26 billion in 2004, roughly 10% of its gross domestic product.

Surging oil revenues have helped to significantly boost the international reserve assets of oil-exporting nations. In Russia, for example, where a dearth of international reserves resulted in a default on its debt obligations in 1998, reserve assets skyrocketed to \$266 billion in September 2006 from \$12.5 billion in August 1998 and \$120 billion in 2004.

Very Little Flow Back

Despite the obvious increase in the flow of dollars to oil-exporting nations, cross-border flows have not been as strong as in the past. The Bank for International Settlements (BIS) notes that the inflation adjusted net stock

of liabilities of BIS reporting banks vis-à-vis OPEC member countries was largely flat in the three years through the end of 2005, increasing just 3%. Importantly, the outstanding stock of dollar-denominated liabilities actually decreased during the same period, by 4%. In other words, the BIS data indicate that relatively little of the surge in oil revenues earned by OPEC had flowed back into the international banking system, especially with respect to the flow of dollars. Indeed, the share of dollar-denominated funds deposited by OPEC member countries into BIS reporting banks fell from 75% of total deposits in the third quarter of 2001 to 62% in 2005. Much of the money was shifted into euro-denominated deposits, which rose from 12% of total deposits to 20% during the same period, evidence of reduced preference for Eurodollar holdings.

OPEC Slow to Buy Treasuries while World Doubled Its Holdings

Nowhere perhaps is the lack of petrodollar flow more apparent than in the U.S. Treasury market, which would seem an obvious place for at least some of these petrodollars to flow to. Not this time. Despite the enormous number of dollars flowing to OPEC member countries, OPEC's Treasury holdings actually decreased through most of 2005, falling to \$54.6 billion at the end of September 2005 from \$62.1 billion at the end of 2004 and up by only about \$2 billion over the prior three years. It wasn't until late 2005 and early 2006 that OPEC purchases of Treasuries increased, rising from \$79.3 billion in November 2005 to \$103.1 billion in July 2006, likely reflecting the superfluous flow of monies there and a shift out of Middle Eastern equities into bonds (more on this later).

Just why it is that the flow of petrodollars was so low relative to what one might expect appears to relate to political factors as well as domestic economic considerations. On the home front, many oil exporters have been using their increased cash flow to address lingering economic problems and to boost social services. This is a concept that is easy to grasp when one considers that many oil exporters saw their financial plight worsen over the past two decades when energy prices stagnated. It is notable, for example, that during the 1990s OPEC's oil export revenues were just \$1.7 trillion when adjusted for inflation compared to \$2.3 trillion in the 1980s, and \$3.0 trillion in the 1970s, according to the U.S. Department of Energy (DOE).

When combined with a surge in population growth, the reduction in inflation-adjusted oil revenues has cut incomes per capita in OPEC member countries to \$700 in 2005 from \$1,804 in 1980, the DOE reports. In Saudi Arabia, for example, where its inflation-adjusted oil export revenue fell from \$211.7 billion in 1980 to an estimated \$150 billion in 2005, a tripling of its population (Saudi Arabia has had one of the fastest growing populations in the world) has contributed to a reduction in its per capita income to \$4,600 from \$22,600 in 1980. Such strains have boosted Saudi Arabia's unemployment rate to over 15%, helping to explain why relatively few petrodollars flowed around the globe after the initial stages of the price surge this time around compared to the surge in the 1970s and 1980s. Many oil exporters simply needed the money.

Many of the would-be petrodollars have stayed within the oil exporting countries because the countries spent it at home. In Saudi Arabia, overall government spending was 28% above budgeted levels in 2004, partly because of increased spending on social programs and increased spending on security, which jumped 50% or \$2.4 billion in 2004. In Venezuela spending on social programs has been running more than double what was budgeted, which is concerning some who feel that Venezuela's oil infrastructure has been chronically underfunded and is thus threatening its future oil production.

The miniscule amount of U.S. Treasury purchases by OPEC member countries could also have been related to political factors. While it is true that countries in general have been endeavoring to diversify their reserve assets, dollar holdings—and thus Treasury holdings—have nonetheless been increasing worldwide, as evidenced by the U.S. Treasury's monthly data on international capital flows. Indeed, the data show that there has been a marked acceleration of foreign buying of Treasuries in recent years, with foreign holdings of Treasuries doubling from 2003 to 2006. This buying has occurred simply because more dollars have been flowing out of the United States than ever before, owing to its massive current account deficit.

Likewise, OPEC has certainly been a recipient of these dollars in recent years, yet the money did not quickly flow back into the United States in the same way that the dollars earned by Asian exporters such as China have. One reason almost certainly relates to the geopolitical environment and in particular the U.S. military action in Iraq and Afghanistan. Few other viable explanations appear to account for the extraordinary degree of restraint with respect to OPEC's Treasury purchases. Some OPEC

members might even be worried about the notion of “hostage capital,” where the United States could freeze a country’s assets or impose special regulations that render the assets unavailable for withdrawal from the United States if conditions were viewed as requiring such a harsh response.

At least some of the mystery of the missing petrodollars could well be related to the fact that large amounts of OPEC’s current account surplus are held off the books, so to speak, of the official reserves of OPEC’s member countries. This is why the increase in OPEC’s official reserves has been less than 30% of its current account surplus. Much of the money has instead gone toward government stabilization and investment funds and to national oil companies, whose investment flows are more difficult to track.

Still, the shortfall between the number of dollars flowing to oil-exporting nations and the recycling of these petrodollars back into the global financial system is large enough to suggest that a relatively small number of petrodollars have been recycled.

Oil Exporters May Want to Avoid the Mistakes of the 1970s

Aside from increased domestic spending, oil exporters are allocating their monies in a variety of other ways these days compared to the 1970s and 1980s. Part of the reason relates to key mistakes made during those years when oil exporters boosted their spending to unsustainable levels and also engaged in investments that had very little lasting impact on the long-term growth rates of their respective economies. Learning from the mistakes of those years, these days many oil exporters have been working to reduce their debt obligations. Saudi Arabia, for example, cut its debt to \$164 billion in 2004 compared to \$176 billion a year earlier. Such efforts have helped Saudi Arabia lower its debt-to-GDP ratio from 100% in 2000 to 75% in 2005.

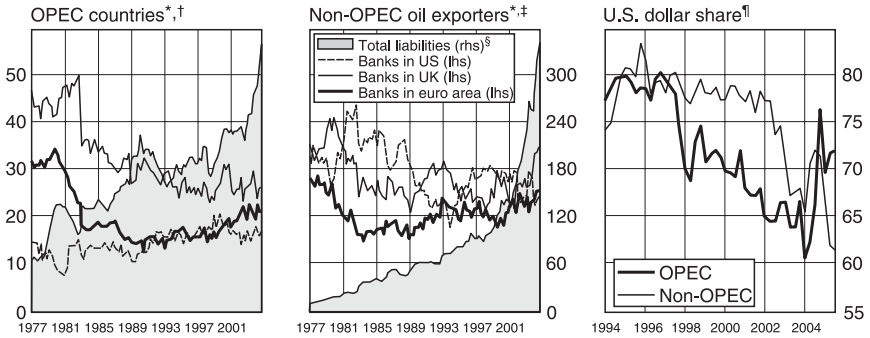
Oil exporters have also raised their levels of assistance to other countries. In fact, Arab states were already among the largest donors in the world before the recent surge in oil revenues, providing large sums of money for official development assistance. For example, the OPEC Fund for International Development provided loans to over 40 countries in 2004. Organizations such as the OPEC Fund, the Arab Monetary Fund, and the Inter-American Development Bank have provided billions of dollars in assistance over the years and such funding increased in the early 2000s.

Buoyant Domestic Stock Markets Grab Oil Dollars

While the recycling of petrodollars was relatively sparse for a while for the reasons cited above, an added reason almost certainly was the buoyancy of the stock markets within the oil-exporting nations beginning in 2003 through February 2006, when prices peaked and began a sharp correction, likely causing a shift in asset allocation toward bonds, including Treasury securities. Saudi Arabia's stock market, for example, gained a whopping 800% over 2003 to the peak in early 2006. The same can be said for many other Middle East stock markets, some of which increased by even larger amounts. Egyptian shares, for example, increased by 1,400% during the same period. Given these sizable returns, oil exporters found ample justification for investing in their own backyards, investing their oil revenues in their own stock markets.

Shares in oil exporting nations almost certainly got a lift from the abundance of cash flowing from the high price of oil, spurring a jump in the money supply there. For example, in the oil-exporting countries in the Middle East, the money supply increased at a pace of about 20% in the several years through the end of 2005, and credit allocation to the private sector was up by nearly 30% in 2004–2005 compared to a pace of about 18% from 1999–2003, raising the risk of accelerating, particularly since many oil exporters such as Saudi Arabia peg their currencies to the dollar. The peg makes it difficult to drain the excess liquidity, because if it were indeed drained, the respective currencies would begin to rise in value against the dollar, and the pegs would hence become undone. Instead, the liquidity remains, raising the risk of economic overheating and inflation if the condition persists.

Eurodollar deposits by OPEC-member countries as a percentage of overall deposits in BIS-reporting banks fell steadily from 1996 through 2004 when the surge in stock prices and continued high energy prices gave a considerable lift to the flow of dollars into the Middle East. This is shown in Figure 7.17, in the chart furthest to the right. Apparently, the abundance of dollar revenues caused a break in the downtrend in dollar recycling, which is quite evident in the chart. The chart shows that non-OPEC oil exporters have also been increasing their share of dollar deposits, with the trend actually accelerating beginning in 2002 and into 2006. The first and second charts show the very large impact that the surge in oil revenues has had on Eurodollar deposits, as evidenced by the large number of deposits placed by oil exporters in BIS-reporting banks (recall that for banks, deposits are considered liabilities).

FIGURE 7.17**Total bank liabilities vis-à-vis oil-exporting countries**

* Lines represent individual reporting countries' share of BIS-reporting banks' total liabilities. The drop in shares in the fourth quarter of 1983 is the result of the inclusion of new reporting countries.

† Excluding Indonesia.

‡ Angola, Egypt, Mexico, Norway, Oman, and Russia.

§ In billions of U.S. dollars.

¶ U.S. dollar-denominated share of total liabilities vis-à-vis oil-exporting countries, in percent. These stocks are adjusted for valuation effects using constant 2005 Q3 exchange rates.

Source: Bank for International Settlements

As an aside, it is interesting to consider that with countries in both Asia and the Middle East pegging their currencies to the dollar, the dollar's reserve status is being fortified and therefore imparting a benefit on the U.S. economy. In turn, this helps the U.S. economy to grow strong enough for the United States to maintain both its military and economic hegemony, hence enabling the United States to have both guns and butter, as they say.

Impact on Gold

One likely destination for the current flow of petrodollars is the gold market. Russia is perhaps the best example of how surging oil revenues can affect other markets such as gold. In 2005, Russia said that it would like to at least double its gold reserves, a very believable assertion when one considers the fact that Russia's holdings of gold reserves actually declined slightly since 1998 to \$3.7 billion near the end of 2005.

The decline in gold reserves occurred despite the surge in Russia's total reserves, which consist largely of foreign currency reserves.

In light of such disproportionate changes between currency and gold reserves and given the increasing acceptability of gold as an asset class, oil-producing countries, as well as many other countries experiencing a surge in their dollar reserves, seem likely to accelerate their buying of gold.

Stay Tuned to the Petrodollar Story

In sum, the story of just where the world's petrodollars will go is one that continues to unfold. It is a trend that bears watching given the massive increase in oil revenues that has occurred in recent years and the impact that the flow of dollars can have on economies and markets worldwide.

Mismatch Strategies

Because of rollovers, most assets that a bank in the Eurodollar market is financing have original maturities of three or six months, although many may go longer. In financing these, a bank can mismatch in various ways. The most extreme approach would be to rely on overnight money. Doing so would normally create the greatest positive spread from mismatch, but it would also expose the bank to the greatest rate risk. An alternative would be to fund a new asset for part of its life. For example, a bank might fund a 6-month asset with 4-month money (*buy 4s against 6s* in the jargon of the trade) and then fund the remaining two months with overnight money or a purchase of 2-month Eurodollars. One consideration in plotting this sort of strategy is the maturities that are most actively traded in the Eurodollar market. Funding a 6-month asset with 1-month money would leave a bank that planned to match fund the tail of the asset in need of 5-month money, a maturity in which the market is thinner than, say, 3-month money.

If a bank buys 4s against 6s or pursues some similar strategy, it creates an open position in its book and thereby assumes a rate risk. One way it can eliminate that risk while simultaneously locking in a profit from the mismatch is by entering into a *forward forward* contract; that is, *buying money of a fixed maturity for future delivery*. In the example above, the appropriate forward forward contract would be for 2-month money to be delivered four months hence.

The seller of a forward forward assumes a rate risk because he cannot be sure how much it will cost him to fund that commitment. Therefore, he will enter into such a contract only if he is compensated for his risk. In our example, the seller of 2-month money four months hence will want to get something more than the rate he expects to prevail on 2-month money four months hence. For his part, if the borrower is locking up a profit on his mismatch, he might be willing to pay some premium on the forward forward contract. Another reason a buyer and seller might strike a forward forward deal is that they entertain diverse opinions on where interest rates are headed.

In the game of mismatching, the big U.S. banks have an advantage over their competitors in forecasting Eurodollar rates. One reason is that Eurodollar rates, as shown in Chapter 18, tend to track U.S. rates closely, with U.S. rates doing the leading. This gives banks that are active in the U.S. money market and have a close feel for developments there (i.e., domestic banks) an edge over their foreign brethren in predicting Eurodollar rates.

Also, the bigger the bank, the better the input it is likely to get from the head office and the more intimate the contact between London and head office is likely to be. As the chief dealer in the London branch of a top U.S. bank put it, "We get tremendous input from New York. I speak to people there two hours every afternoon on the phone. Also, the foreign exchange desk next to mine has a direct line open to New York at all times, and we have e-mail. All that information permits us to quickly build up a feel for conditions in the U.S. market. There's no way smaller banks or foreign banks can get access to the same information. They can read it tomorrow in the paper; we get it right away. That's important because in this market a few minutes sometimes make a crucial difference."

The information flow between London and New York is not one way. At times London sees things New York does not, and the two have differing rate views. For example, at a time when New York anticipated a continued ease in rates, a London dealer looking at his book might conclude that both Eurodollar and domestic rates in a certain maturity range were likely to firm up temporarily at least due to a confluence of scheduled Eurodollar rollovers. Alternatively, if New York foresaw a slight upward bias on rates because domestic loan demand was strengthening, London might temper that view by arguing that no parallel increase in loan demand was occurring outside the United States.

THE USE OF OFF-BALANCE SHEET ITEMS

“The degree of mismatch in the book is still an issue,” noted one U.S. banker in London. “But now we have many more off-balance sheet tools with which to do this. By using the latter, we economize balance sheet usage. We often describe our off-balance sheet activity as a hedge of our balance sheet activity, and in some sense, that is true. However, the activity has grown to a point that we and most other banks are actually trading these items. The big volume of trading is in futures, FRAs, and swaps, not in the taking-and-placing market. This is because everyone is in the same boat—wanting to trade off-balance sheet.”

FRAs

Futures are a near perfect way to hedge risks that match the four yearly international monetary market (IMM) dates.¹⁴ However, most bank risk is “non-IMM” risk; hence, the development of FRAs (forward rate agreements). We discuss FRAs in greater detail in Chapter 18. In this section we provide some basics.

A *FRA* resembles a forward forward except that it’s settled not by making or taking a deposit, but rather by making a cash (settlement) payment. For example, if bank A promises to pay bank B a rate of 5½% on a \$200 million, 3-month deposit to be received two months hence, bank A will have to make a cash payment to bank B if two months hence the 3-month rate is below 5½%, but bank B will have to make a cash payment to bank A if two months hence the 3-month rate is above 5½%. In this example, the amount of the cash payment would equal the difference between 5½% and the 3-month rate on the day the FRA settled, times \$200 million, times the appropriate annualizing factor, which is 3 months over 12 months or ¼ of a year.

FRAs are easy to trade because the concept is simple. Also, dealers and brokers quickly standardized the terms of the agreement.

¹⁴ It may be pedantic to say that the hedge is “near perfect,” but in fact a lot of hedges that look perfect work out to be slightly less than perfect. The problem is that a measure of 3-month LIBOR on a given morning depends on which banks are sampled at what hour and in what manner; in some fixings, *Y* banks are sampled, the *X* highest and lowest quotes are discarded, and the remaining quotes are averaged to get LIBOR. Futures in Chicago and London have their own fixings for LIBOR; FRA contracts incorporate other fixings. On some days, for whatever reasons, different fixings on LIBOR can produce different numbers.

The obvious advantage of FRAs over forward forwards is that they permit a bank to make the same bet it could with a forward forward, but at settlement they cause neither the making nor the taking of a deposit. A FRA does for a bank the same thing that a forward forward would without affecting at any point the bank's footings.

Also, if a bank becomes unhappy with a position in FRAs—it changes its rate view—it can eliminate its FRA position by doing an off-setting FRA trade, again with no balance sheet impact. In contrast, if a bank becomes unhappy with a position it has established using cash deposits or forward forwards, it must—to eliminate that position—double up positions, which will affect its balance sheet, either immediately or at a later date.

FRAs: An Example

Here's an example of how a banker might use a FRA. "Suppose," said one bank officer, "that an Asian exporter comes in and wants to give the bank a \$300 million deposit for one year. I quote him 5%. Say I start the day with the following funding plan: I want to take \$900 million of 1-month money, \$600 million of 3-month money, and \$300 million of 6-month money. I don't want 1-year money, but I do want 6-month money; so I convert this 1-year money into 6-month money by doing a 6s-against-12s FRA where I place the FRA at 5%. With this deal, I have converted a 1-year taking into a 6-month taking, and I need take no 6-month money for the day.

"In my example, 1-year money coming in doesn't fit my book—taking it would be against my interest-rate outlook. In the past, I would have gotten rid of such money by placing it for one year at LIBOR, and I'd have earned a spread, LIBOR minus LIBID. Now, I worry about the balance sheet, so instead I use a deposit in a maturity I don't want as a substitute for a deposit in a maturity I do want."

FRAs, a Precise Hedge

The beauty of FRAs is that they can be dealt for any dates, whereas futures get dealt for only four dates in the year. If a depositor comes in at the end of April and wants to place \$200 million for one year, a bank, by using FRAs, can immediately convert that 1-year deposit into a 6-month deposit. The best a bank could do using futures would be to buy the

September and the December contracts, which would create an imprecise—one-month off—hedge. FRAs owe much of their popularity to the fact that dates in the FRA market are congruent with those in the cash market.

A bank that uses futures, rather than FRAs, to hedge always has basis risk unless the period the bank is hedging precisely matches the period covered by one IMM contract or by a strip of them. Basis risk occurs because the rate locked in isn't exactly the rate being hedged. (For more on basis risk, see Chapters 15 and 16.)

Jargon

In FRA-land, the jargon is buy and sell. If you *sell* a FRA, you are lending the rate, and you hope interest rates will fall. If you *buy* a FRA, you are borrowing the rate, and you hope that interest rates won't fall.

INTEREST-RATE SWAPS

In Chapter 2, we introduce interest-rate swaps—probably the greatest financial innovation of the 1980s. Here we focus on swaps principally as a tool in bank asset-liability management. (For more on swaps, see Chapter 19.)

Arbitrage

One interesting aspect of the off-balance sheet items we are discussing is that, while they appear to be quite different animals, it's often possible to construct the equivalent of the one out of the other. Thus, lots of opportunities exist to use one off-balance sheet item to arbitrage against, to hedge, or to substitute for another.

To illustrate, consider a 2-year swap in which one party agrees to pay 2-year fixed and to receive 6-month LIBOR. There is a consecutive set (*strip*) of FRAs that is equivalent to this interest-rate swap. Specifically, for the payor of fixed, the swap is equivalent to getting today's 6-month LIBOR, which is set on the day the deal is done, plus buying three consecutive FRAs: a 6s–12s FRA, a 12s–18s FRA, and an 18s–24s FRA. The equivalence of a short-term swap to a strip of FRAs has led traders to arbitrage between these two markets, which in turn holds rates in the two markets in line with each other.

We mention above the equivalence of Eurodollar futures to FRAs done to IMM dates. Naturally, this equivalence has led traders to arbitrage these two instruments, which causes them to trade at almost identical rates. Interest-rate swaps can be hedged not only with a strip of FRAs, but with a strip of futures: specifically, by buying a strip of futures, a trader can accomplish the same thing he would if he did a swap in which he became the receiver of floating. This also means that futures can be used to hedge a swap. Swap desks use futures as substitutes for Treasuries to hedge swaps in the 1-, 2-, 3-, and 4-year range in particular, and also beyond. One consequence is that the spread between the swap market and the futures strip has been eliminated via arbitrage.

Creating a Synthetic, Fixed-Rate, 5-Year Asset

It sometimes occurs that a bank's asset-liability manager takes the view that interest rates are going to go down and, consequently, he'd like to acquire a 5-year, fixed-rate asset. Chances are that his bank is not making any 5-year, fixed-rate loans, and even if it were, such a loan would not be a particularly liquid asset. No problem. The bank's asset-liability manager can use the swap market to create the asset he desires. Specifically, he can enter into a 5-year interest-rate swap in which he receives fixed and pays floating (normally LIBOR). If his bank has a securities affiliate, he may get his swap from that affiliate, which is typically in the business of trying to make a profit by trading swap spreads, so it will hedge the swap it has done with the bank by buying, say, 5-year Treasuries until it can trade out that swap at a profit.¹⁵

A swap is an attractive asset from the bank's point of view. Credit risk is minimal, and capital requirements incurred are small. Another advantage to a bank in taking a position in swaps is that if the bank changes its view on interest rates, it can generally unwind the swap it has put on by doing another swap. "The swap market," noted one London banker, "is an absolutely colossal market. Generally, you can go into the swap market and borrow money

¹⁵ Note that the securities affiliate's hedge does not undo the position put on by the bank. From the point of view of the consolidated balance sheet of the bank holding company (which owns both the bank and its securities affiliate), fixed-rate, 5-year securities—probably funded with repo—have been acquired.

back the other way [do a reverse swap] with comparative ease. If I do a swap where I receive 5-year fixed and six months later I want out, I would go back to the swap trader at our affiliate to get an offsetting swap.”

Another bank asset-liability manager noted, “We use swaps as a way of creating a position—almost like a cash deal although no cash changes hands. For us, swaps are principally a tool to create interest-rate gaps, rather than to trade or to hedge.”

Offsetting a Deposit in an Unwanted Tenor

A swap, like a FRA, can also be used by a bank to offset a deposit that does not fit its funding requirements. Here’s an example. “Suppose,” said a U.S. banker in London, “that an investor gives us \$300 million of 5-year money. We don’t want that 5-year money because we think that interest rates are going down. So we do an interest-rate swap with a merchant bank, say, JPMorgan. Under the swap, we pay 6-month LIBOR and receive a fixed, 5-year rate that’s maybe a 5-bp spread over what we’re paying the investor [due allowance made for compounding of the variable 6-month rate]. Effectively, I have converted the 5-year deposit I’m taking into a series of 6-month deposits; thus, I’ve satisfied my customer by taking his money, but I haven’t violated my original funding plan in doing so.”

Playing a Swap against Redeposits and FRAs

An imaginative banker can also use an interest-rate swap to enhance his return on assets (ROA) by working the swap in conjunction with his redeposit book. “In the Eurodollar book,” noted one banker, “we do the transformation [gapping] as usual, but there’s an important dimension in management of the Eurodollar book—the swap business. If I see rates going lower but the yield curve is steep, I would, at today’s rates, lend 5-year with a swap at $5\frac{3}{4}$ and pay 6-month LIBOR which is 5.0. That means that, for the next six months, I earn a $\frac{3}{4}$ -point spread if I just do the swap. But I am bullish and think that rates are going down not in six months, but in one month. In that case, I can neutralize my effective 6-month borrowing with a 6-month redeposit and become a taker of overnight funds at 4.75. By doing so, I increase my spread by 25 bp. That 25 bp does not in and of itself justify the use of the balance sheet, but when I decided to lend 5-year money via the swap, I wanted the 1-point differential between the 5-year rate and the overnight rate.

“At times, I will be happy about the swap repricing I expect to get, and at other times, I will be unsatisfied. I have to have this balance sheet [the placement book] to eliminate the days when I am unsatisfied. Ideally, I could buy or sell futures when the risk of an unfavorable repricing looks high. In practice, however, repricing dates on a swap usually don’t match the futures contract dates; and in the current market, you can, from week to week, have a 25-bp differential in yield on the 6-months. So futures are a poor protection for me in this case; and consequently, I must use either the cash market or the FRA market to protect myself when I risk an unfavorable repricing. By trading in either market I can neutralize [over a reset date] the floating-rate portion of my swap.”

OFF-BALANCE SHEET ITEMS AS SUBSTITUTES

The Eurodollar market, like the domestic market, tends to gap trade off economic numbers. “People focus,” noted one trader, “on economic releases to the point of virtual paranoia at times. What you find now is that people will do nothing before a release and react just like that afterwards. If a number comes out and it’s much worse than people expected, then the [Eurodollar futures] contract just goes down 5 or 10 points, but then it will bottom out and come back because people were short before the number, and there’s profit taking going on. Basically, the market tends to overreact to a number. Once people look at it, they tend to say, in the full perspective, the change is not as good or bad as we thought at first glance. Maybe we should hang a sign in the trading room: ‘One swallow doth not a spring make.’”

In any case, a funding officer must react to economic news, Fed speeches, and everything else that hits the newswires and, in doing so, he can, depending on market conditions and what he wants to do, use the various instruments discussed above as substitutes for each other. “Say I did my funding plan in the morning,” noted a London Eurodollar banker. “Then at 1:30 p.m., the [U.S.] GDP report comes out, and the deflator is lower than expected. What do I do? First, I place more FRAs or receive in a swap. I don’t lend cash. I rarely do. Futures are something I might try to do if I wanted to react quickly, but futures are hard to do after a number because everyone piles into the pits.

“If I wanted to adjust my position in the afternoon, I might put out a few offers in the FRA market and in the swap market, but if I do not get my prices in those markets and I do not want to go home with the

positions I have, I will just go out and buy \$300 million futures. I use futures whenever I cannot get the position I want using the other instruments. I always know that I can go to the futures market and get a rough approximation of the position I want. The advantage of futures is that you always have liquidity, so you can readjust your position with ease.”

The interplay between different noncash instruments occurs in various scenarios. The same banker noted: “Once I get a load of interest-rate swaps on your book, I’m vulnerable to every 6-month rollover. Maybe one month, before the 6-month repricing, I get worried about interest rates rising. Maybe the Fed is going to change policy and instead of getting repriced at 5, I risk getting repriced at 5½. The simplest and quickest way for me to hedge against that would be to buy futures. A FRA might be a better hedge, but maybe I can’t get a FRA to my date; if not, I have to buy futures.”

EUROCURRENCY SWAPS

The bulk of the Eurocurrency market consists of Eurodollar deposits, but it also includes Eurodeposits of euros, sterling, Swiss francs, yen, and other currencies. The uninitiated might think of a bank accepting deposits in all these currencies as ending up with a mixed bag of different kinds of money. Not so the Eurobanker; he knows that he can turn one currency into another through the simple device of a *swap*. To him money is money whatever its country of origin.

In the foreign-exchange market, currencies are traded for each other on two bases, *spot* and *forward*. In a spot transaction, say, yen for dollars, the currencies exchanged are normally delivered two days after the trade is made. In a forward transaction, the exchange occurs at some specified date further in the future, perhaps months later. *A swap is a pair of spot and forward transactions in which the forward transaction offsets or unwinds the spot transaction.* For example, if a holder of yen traded them for dollars in the spot market and simultaneously entered into a forward contract to sell these dollars for yen three months hence, he would have engaged in a swap. Note that the effect of this transaction is to permit the holder of yen to go into dollars for three months without assuming a *foreign-exchange risk*. Specifically, by locking in a selling rate for the dollars he acquires, the swapper eliminates the risk that he might suffer a loss resulting from a fall in the exchange value of the dollar against the yen while he holds dollars.

Large banks all act as dealers in foreign exchange. The individuals who run this part of the banks' operations take speculative positions long and short in various currencies as part of their normal dealing activities—making markets and servicing customers' buy and sell orders. Also, based on their expectations of probable changes in exchange rates, they will assume speculative positions in foreign exchange designed to earn profits for the bank. Such activities expose the bank to *foreign-exchange risk*. This risk, however, is one that the bank is prepared to assume within limits because the people in the foreign-exchange department are experts in this area.

Funding officers, in contrast, have their greatest expertise in areas other than foreign exchange. As a result, banks in their Euro operations confine their speculation in foreign exchange to the foreign-exchange department and require that funding officers match their Eurobook in terms of currencies (e.g., use dollar liabilities to fund dollar assets). Thus, when a Eurobanker receives a deposit of a currency other than the dollar, he will sell that deposit in the interbank market, swap it for dollars, or use it to fund an asset denominated in that currency. Also, if he's asked to extend a loan denominated in a currency other than the dollar, he will fund that loan either by buying a deposit of that currency or by swapping dollars into that currency.

Most of the time, the spot and forward rates at which any currency trades against the dollar will differ. In particular, the dollar price that a foreign currency commands in the forward market will be higher than the spot rate if this currency can be borrowed more cheaply than the dollar or if it's expected to appreciate in value relative to the dollar. The opposite conditions will cause the currency to sell at a discount in the forward market.

If a currency is selling at a premium in the forward market, a swap out of the dollar into that currency will yield some gain, while a swap out of that currency into the dollar will produce some loss. If, alternatively, a currency is selling at a discount in the forward market, the result will be the reverse. The gain or loss inherent in any swap, the amount of which can be calculated at the time the transaction is arranged, can be expressed as an annualized percentage rate of gain or loss through the use of a simple formula. This rate of gain or loss is a crucial element in a bank's decision about what rates to charge on nondollar loans and to pay on nondollar deposits.

For example, suppose that a corporation offers a bank a 3-month sterling deposit and that forward sterling is selling at a premium. If the

bank accepts the deposit, it will swap these sterling into dollars and in doing so will incur some loss. It will, however, also earn the going 3-month LIBOR rate on the dollars it obtains from the swap. Thus, the rate that the bank offers the depositor will equal roughly 3-month LIBOR minus the annualized rate of loss on the swap. In costing a nondollar loan, the bank follows a similar approach.

On swap transactions, interest payments generate a residual foreign-exchange exposure. For example, if a bank takes in a 3-month sterling deposit and swaps it into dollars, the bank assumes a foreign-exchange risk because it is committed to pay interest in sterling on the sterling deposit at maturity, while it will earn interest at maturity in dollars on the dollars it has loaned. If the bank chooses to avoid this risk, it can lock in a fixed spread on the overall swap by buying sterling (selling dollars) *forward* in an amount equal to the interest to be paid in sterling.

Several large banks that receive many deposits of nondollar Eurocurrencies and also have many requests for loans denominated in those currencies actually run books in each of these currencies, matching deposits in these currencies against loans and placements in the same currencies. Doing so eliminates transactions costs associated with swaps into and out of dollars—the foreign-exchange dealers’ spreads between bid and asked prices in the spot and forward markets and some bookkeeping and ticket costs. Banks running books in Euroyen and Euro Swissy feel that this reduction in costs permits them to offer depositors and borrowers of these currencies slightly better rates than they could if they consistently swapped all the *natural* yen and Swiss franc business they received into dollar assets and liabilities.

We have talked about banks using swaps to match their Eurobooks (in terms of currencies held and lent). Banks also use swaps another way—to minimize funding costs. Suppose, for example, that a bank wants to fund a 6-month dollar loan. To any funding officer, every Eurocurrency deposit is nothing but a Eurodollar deposit with a swap tagged on. Thus, in shopping for 6-month money, a bank dealer will price out not only 6-month dollar deposits but 6-month dollars obtained by swapping deposits of other currencies into dollars. If 6-month dollars can be obtained more cheaply by buying 6-month Euro Swissy and swapping them into dollars than by buying dollars, the dealer will go the swap route.

Because banks in the Euromarket seize every opportunity available to reduce their borrowing costs through swaps, the all-in cost of dollars obtained by swapping any actively traded Eurocurrency into dollars tracks

closely the yield on dollar deposits of the same tenor. Thus, the rate saving that a bank can obtain by using a swap to obtain dollars usually amounts to only a narrow spread. However, when the foreign-exchange market moves dramatically, short-lived opportunities for saving a few basis points through a swap can occur.

BANK OF ENGLAND REGULATION

Since London is the preeminent center of the Euromarket, a look at financial regulation in the London market seems appropriate.

The first point to be made is that regulation of domestic banking has always been far less formal in Britain than in the United States or on the Continent. Unlike many U.S. bank regulators, the Bank of England proceeds on the assumption that bankers are prudent, honest people who know as much if not more about banking than regulators do. Thus, the Bank of England's approach for years was not to impose regulations and ratios on the banks; instead it asked for periodic reports from the banks. On the basis of these, it discussed informally with each bank's top management the quality of the bank's loans, its liquidity, any features of the bank's condition that the Bank of England viewed as unusual or out of line, and any suggestions that the Bank of England might make with respect to the bank's operations.

The Banking Act of 1979

Unlike any other country, the United Kingdom for centuries had no banking act that regulated its highly developed banking system. Instead, banking in the United Kingdom thrived under the informally administered Bank of England regulation described above. By the late 1970s, several factors made this situation untenable.

The first was the 1973 banking crisis. In the early 1970s, there was a credit boom, a money supply boom, and a consequent boom in home prices. At the time, a lot of second-tier banks existed merely to take deposits and relend them to property companies with whom they were sometimes affiliated. These banks geared up like crazy, and when the property bubble burst, many were in deep trouble. The resulting mess, dubbed the Banking Crisis of 1973, was dealt with by the Bank of England. To prevent endemic contagion, the bank nursed back to health those banks that did matter, while letting others fail. The 1973 crisis suggested

the need for a more formal system of bank supervision that actually had legislative backing.

A second need for action stemmed from the United Kingdom's membership in the *European Economic Community*. EEC requirements with respect to banking harmonization mandated that all banks within the EEC be officially licensed before they could do banking business. British banks were not so licensed.

Against this background, the United Kingdom passed the Banking Act of 1979. This act authorized two forms of deposit-taking institutions, namely, *recognized banks* and *licensed deposit takers*. Either type of institution could provide as many banking services as it wished, but a bank could be licensed as a recognized bank only if, in addition to accepting deposits, it (1) made loans, (2) traded foreign exchange, (3) provided bill finance and handled foreign trade documentation, and (4) engaged in investment management and corporate finance. Both recognized banks and licensed deposit takers came under regulation by the Bank of England, which continued in the main its informal approach to regulation. The many foreign banks operating in the United Kingdom were treated in precisely the same way as were domestic banks.

Another wrinkle added to U.K. banking at this time was the setting up of a deposit protection fund to protect small depositors in case of a bank failure.

The Banking Act of 1987

The first British banking crisis was quite broad-based. A second bank crisis occurred when a second-tier British bank, Johnson Matthey, failed. This bank failure was regarded as serious because Johnson Matthey was one of the five members of the British bullion market. Thus, its failure could have affected the other banks in the bullion market and thereby the bullion market worldwide. To prevent any such untoward events, the Bank of England bailed out Johnson Matthey, just as the FDIC bails out a failed U.S. bank.

At the time, it was said, rightly or wrongly, that Johnson Matthey ought not to have gotten into the straits it did without the Bank of England having perceived the problem, which it did not. In defense of the Bank of England, it should be noted that, at the time, it, because of fiscal stringency, had only 50 to 100 people supervising all banks, domestic and foreign, in the United Kingdom; the number is significantly higher today.

In any case, a new banking act was passed in 1987. This act is broadly the same as the 1979 act except that it established just one tier of banks instead of the two that existed previously. The 1987 act also tightened supervision somewhat, and there have been papers detailing additional guidelines for banks on liquidity, ratios, capital, and so on.

The Bank of England Act of 1998

The most recent legislation is the Bank of England Act of 1998 which established the arrangements for the Bank of England's current monetary policy responsibilities. Under the 1998 act, the banking supervision function that had previously been undertaken by the Bank of England was transferred to the newly formed Financial Services Authority. In turn, responsibility for overall financial stability issues was essentially spread among three separate legal entities: the Bank of England, the Financial Services Authority, and HM Treasury. While there is no legislation that formally sets out the respective responsibilities of the three bodies on financial stability, a memorandum of understanding among the three parties was established. This arrangement fits with the long-standing tradition at the Bank of England by facilitating the maximum amount of flexibility in the banking system and avoiding red tape and restrictions of various sorts found in other countries.

It astounds to consider the long history of the Bank of England, which is quite evident in the opening paragraphs of the 1998 act, which contains the Bank of England's updated charter:

TO ALL TO WHOM THESE PRESENTS SHALL COME, GREETING!

WHEREAS by a Charter granted by Their Majesties King William and Queen Mary in pursuance of the Bank of England Act 1694 and dated the twenty-seventh day of July in the sixth year of their reign the Governor and Company of the Bank of England (hereinafter called "the Bank of England") were duly incorporated with perpetual succession and a common seal and such rights, powers and privileges as are therein described.

Few banking systems can trace their roots back to the 1600s, but age alone does not explain the success of England's famed banking system. Its success is the result of years of policies bereft of constraints and government interference; in its place has been the capitalist system at its finest.

Regulation of Foreign Banks in London

When foreign banks came to London, they were treated in much the same way as domestic British banks. If the Bank of England recognized a bank as reputable in its home country, it permitted that bank to open a London branch with a minimum of red tape. The bank did not have to put in any capital; all it had to do to open an office was to agree to comply with certain regulations, and it was granted the same right to engage in banking that any other bank in the United Kingdom had. Foreign banks establishing independent entities, merchant banking subs or banking consortia, did have to put in capital, but again if the parentage was reputable, the red tape was minimal. As an executive of a large U.S. bank noted, "When we went to the Bank of England for permission to open a merchant banking arm, they said, 'You need a foreign-exchange trader, someone who knows British exchange control regulations, some capital, and since you are asking to be recognized as a bank, at least a window where you could take deposits whether you do or not. Oh, and one other thing. We'd like you to locate in the City of London. The rents are high which keeps out the riffraff.'"

In justification of the Bank of England's rather casual regulation of foreign banks, it might be added that it operated and still does on the logical assumption that foreign bank branches are an inextricable part of the parent, which implies two things. First, it is difficult if not impossible to regulate these branches as independent entities. Second, the natural assumption is that these branches are being regulated by banking authorities in the parent country, which regulates the activities of the parent bank as a whole.

The ease with which foreign banks could enter the London market and the minimal regulations imposed on their activities there encouraged the entry of hundreds of foreign banks into London. It has also permitted the rapid *growth* and constant *innovation* that have characterized the Euromarket.

To a U.S. regulator, the British approach to bank regulation probably seems like a time bomb guaranteed to create monumental difficulties at some time. Yet, the record shows that the British approach to bank regulation has been at least as successful, indeed more so, than has the U.S. approach. One reason is that there is a lot of mutual respect between banks operating in Great Britain and the Bank of England. Because of this and because of the real powers the Bank of England possesses, banks don't fight "The Old Lady (of Threadneedle Street)"; instead they take her

suggestions seriously. Another reason the Bank of England approach has been so successful is that it is responsible for overseeing the operations of only a limited number of banks, about 100 domestic and several hundred foreign banks. In contrast, U.S. regulators have to cope with almost 8,000 banks. As one Bank of England official noted, the limited number of banks in Great Britain once permitted the Bank of England to know on an almost personal basis the managers of these institutions and thus whether they do or do not need closer supervision.

Naturally with the entry of ever more foreign banks into London, it became increasingly difficult for the Bank of England to pursue its brand of personal regulation. As a result, the Bank of England asked banks to report to it with increasing frequency and visited them more often.

Passage of the recent banking acts—very recent in the context of the Bank of England's long history—put foreign banks operating in London under slightly more formal regulation, but it posed no real problems for them. Basically, Bank of England regulation remains benign. What has, in certain cases, posed problems and red tape for foreign banks operating in London is compliance with the Financial Services Act described below.

The Financial Services Acts of 1988 and 2000

The British *Financial Services Act (FSA)*, implemented in 1988, arose out of concern about the protection of investors. The intent was that ordinary retail investors in the United Kingdom be able to get adequate information about the financial services they were buying and that they be able to get good advice from people professionally qualified to give it. Also, there was the notion that making the provision of financial services in the United Kingdom squeaky clean would, if anything, enhance London's preeminence as a world financial center.

The whole notion that regulation, however detailed, can protect people from their inherent naïveté, greed, and atavistic inclination to believe in the tooth fairy (especially if an investment house is peddling shares or other participations in said fairy) is itself naïve and is moreover daily disproved in the United States. Nonetheless, the British in an uncharacteristic departure from light and sensible regulation produced a massive rule book covering every conceivable investment: life insurance, pension funds, stocks, bonds, and so on. The FSA required any firm that was in securities—selling or advising—to seek authorization from a new body, the *Securities Investment Board (SIB)*, which very broadly was

meant to be an SEC. Where possible the SIB delegated its power to *self-regulatory organizations (SORs)*, such as the stock exchange and the futures market.

The City of London perceived the whole scheme as a dead hand on its business—a most unwelcome change from regulation with a light hand. Some hope for relief appeared when the original chairman of the SIB was replaced by David Walker, one of the younger directors of the Bank of England. Under Walker, the rules were halved, rewritten largely in English, and derived from straightforward principles of right and wrong, as opposed to the principle of comprehensive administration.

Since the FSA was designed to protect the small investor, it should have had little or no impact on the city's wholesale financial activities and in particular on its Eurodollar activities. Not so. The heavy hand of regulation with attendant onerous capital requirements was to fall on everyone—even Eurodollar brokers who daily act as agents for billions in interbank transactions. Affected firms screamed, “Why us? We’ve never seen a retail customer; we’ve never caused a problem; and we deal strictly with professionals who don’t need protection. Moreover, all of this onerous regulation will harm, not enhance, the role of London as a financial center.”

Finally, the message got through; and in April 1988, the Bank of England issued a revised gray paper, which says that any institution that is conducting wholesale, professional business can, if it wishes, be supervised by the Bank of England, not the SIB—in those areas in which it is wholesale and in those markets that are essentially wholesale. This exemption covers brokering between market makers, primary dealings in government bonds, and wholesale dealings in money, interbank deposits, foreign exchange, and so on. The Bank of England has a list of firms being supervised by it. There's no great cachet to being on the list; a firm need only prove it is in the wholesale business to be on it. For banks, the upshot is that some need no FSA authorization to continue their business as is, while others must get authorizations to cover certain of their activities. For foreign securities firms, there was horse trading and bickering because, besides Great Britain and the United States, not many countries have position-risk requirements with respect to capital. Still, the creation of the FSA as the single regulator of financial services is one that has since been taken up in Germany, Ireland, and South Korea. The concept of having a lead or coordinating regulator is one that is also being looked at in the European Union.

In 2000, the United Kingdom passed the Financial Services and Markets Act 2000 (FSMA) (the word, “of” preceding the year is omitted in the actual act), with its stated objective of boosting market confidence, increasing public awareness, protecting consumers, and reducing financial crime, all through the auspices of the FSA.¹⁶ Section 178 of the FSMA requires all persons to notify the FSA if a step they are proposing to take would result in their acquiring control, or an additional kind of control, or increasing a relevant kind of control over a U.K. authorized person, a stipulation that has been debated since the implementation of the act, and which looks likely to be relaxed. Any criticism of the act is most likely to be centered in the small business arena, as over 90% of firms subject to FSA regulation are small businesses.

SOVEREIGN RISK IN LONDON

Investors, both bank and nonbank, depositing dollars in a bank or bank branch located in a foreign country are always concerned with *sovereign* or *country risk*. U.S. investors, particularly those with little experience in international business, used to display a lot of concern over the sovereign risk associated with making dollar deposits in London. As these investors saw it, at least before the United Kingdom’s emergence as an oil producer and its sustained periods of economic growth, the periodic crises through which the pound sterling passed and the chronic weakness of the British economy both suggested that at some time the British might be tempted to block payment on the dollar liabilities of London banks. While one cannot say this could never happen, there is only one conclusion that anyone who has studied the London market carefully can reach: the sovereign risk attached to dollar deposits in London is *very* close to zero.

One practical reason is that Great Britain would gain nothing from blocking payment of the Eurodollar liabilities of London banks during a sterling crisis. From the end of World War II until the United Kingdom became an oil producer, the pound sterling was a weak currency; to prop up its value, the British maintained tight controls on the use of sterling by domestic holders. Because of these controls, the Eurodollar market in London, which would in any case have been largely a market in offshore

¹⁶ From the HM Treasury Web site (hm-treasury.gov.uk), “Statement on the Two-Year Review of the Financial Services and Markets Act,” November 4, 2003.

funds, was strictly a market in offshore funds. With the few exceptions permitted by the British exchange control authorities, all the Eurodollars that flowed into London were owned by foreign depositors, and all the Eurodollars that flowed out went to foreign borrowers. In effect, London acted and still does act largely as a conduit through which dollars flow from foreigners to foreigners. Thus, inflows of Eurodollars to London do not add to British foreign-exchange reserves, and outflows do not subtract from them, which means in turn that blocking payment on the Eurodollar liabilities of London banks would do nothing to stem the loss by Britain of foreign reserve during a sterling crisis.

The financial activities centered in the City of London, including Eurodollar transactions, earn Great Britain large amounts of foreign exchange, provide thousands of jobs, and add vitality to the whole economy. A second reason Great Britain would not block payment on Eurodollar deposits is that, if it did, it would lose these advantages. As a Bank of England official noted: "If the British interfered with the payout of Eurodollars, nationalized foreign branches, or whatever, that would kill more than the Eurodollar market, it would kill London. Any action taken against Eurodollar operations in London would immediately spread to London as a banking center; and if London is not a banking center, then it isn't a commodity market, it isn't an international insurance center, it isn't a stock or investment market generally. In London, these things dovetail closely; if you damage one, you damage the lot. The game would not be worth the candle."

LENDER OF LAST RESORT

A question that troubles some Euromarket watchers is: Who is to act as lender of last resort if the market is rattled by some event? This question really involves two separate questions: Who lends if the supply of Eurodollars dries up? Who lends if the solvency of a major bank or group of banks in the Eurodollar market is threatened through bad loans or other losses?

As noted, dollars can't disappear, but they can move from center to center. Thus, it's conceivable, though highly unlikely, that the supply of dollars in the Eurodollar market could dry up because holders of dollars for some reason decided to move their deposits from banks in Eurodollar centers to banks in New York or elsewhere in the United States. Such an eventuality would not cause U.S. banks severe liquidity problems in their

Eurodollar operations; they could always buy back in the U.S. market any dollars lost in the Eurodollar market and use them to fund their Eurodollar assets. The major inconvenience to them in doing so is that they would incur a reserve cost on domestic dollars funneled to the Eurodollar market. To some extent, foreign banks could do the same thing, but in doing so, they would face a crucial problem: most would be able to buy in the U.S. market only a fraction of the dollars they were accustomed to buying in the Eurodollar market. Thus, in the unlikely event of dollars drying up in the Eurodollar market, foreign banks could face a liquidity crisis. Foreign banks negotiate standby lines with U.S. banks to protect against this risk.

Central banks have discussed at length the question of lender of last resort to the Eurodollar market and have reached the conclusion that each looks after his own. Thus, the Fed is the appropriate lender of last resort to a U.S. banker whether its troubles arise from its New York or London operations, and the Bank of England stands behind the operations of its domestic banks both at home and abroad. The logical thrust of this philosophy is that, if foreign banks experienced liquidity problems with respect to their dollar operations, it would be up to their respective central banks to provide them with dollars, something that the central banks of major countries could do either from their own reserves or by obtaining dollars through swaps from the Fed.

FOREIGN BANK OPERATIONS IN THE UNITED STATES

Foreign banks have used various organizational vehicles to enter the U.S. market. A few have set up wholly owned subsidiaries operated under a domestic banking charter. Of these, a handful of them are long-standing operations. Others are of recent origin.

A second way commonly used by foreign banks to enter the U.S. market is to set up *agencies* in U.S. financial centers. An agency can neither accept deposits in its own name nor hold loans on its own books. Instead, it acts as a loan production office and funding agent for the parent bank. It arranges loans and then books them at some branch of the parent, for example, Cayman, or at the head office. It also acts as an agent for the parent in the New York money market, buying and selling fed funds and Eurodollars for the account of the head office.

The principal reason why foreign banks initially set up agency offices rather than branches in New York was that, under New York State law,

a foreign bank was permitted to set up a New York branch only if its country of origin permitted U.S. banks to establish branches there. A second reason some foreign banks set up a U.S. agency instead of a branch was to avoid the overhead they would have incurred in setting up a branch with facilities for accepting deposits. Finally, prior to the passage in 1978 of the *International Banking Act (IBA)*, foreign bank agencies were subject neither to U.S. regulation nor to reserve requirements. Under the 1978 act, Congress took the view that agencies were, in effect, branches and, as such, should be treated in a fashion similar to that specified for foreign bank branches.

A third way a foreign bank can enter the U.S. market is by setting up a branch. Prior to the passage of the IBA in 1978, foreign bank branches operated exclusively under state banking laws and were regulated solely by state banking authorities. Most are located in New York, California, and Illinois, where specific legislation permitting the establishment of branches by foreign banks was written. Generally, such branches can engage in the full range of domestic banking activities.

Setting up a branch in the United States is expensive for a foreign bank in terms of not only overhead, but taxation. Once a foreign bank establishes a U.S. branch, all its income on loans into the United States becomes subject to U.S. taxation. Yet the U.S. market, and more particularly the New York market, has over the years attracted foreign bank branches as surely as a magnet attracts iron filings.

Foreign banks setting up U.S. branches do so for several reasons. First, they are attempting to follow their customers to the United States just as U.S. banks followed their customers abroad; the growth of international banking is in part a response to the growth of multinational firms. Second, foreign banks are attempting to develop relationships with large U.S. corporations; most of these have foreign operations, and a foreign bank can thus provide them with special services and expertise. Third, foreign banks set up U.S. branches to obtain access to the huge domestic reservoir of dollars. Finally, the United States is a convenient place for foreign banks to run a Cayman or other offshore Eurodollar book. Foreign bank branches also run IBFs.

The position of a foreign bank operating a New York branch is much the same as the position of the London branch of the same bank in the Eurodollar market. It is acquiring assets and incurring liabilities in a foreign currency, the dollar, and it thinks of itself as running a dollar book. In running this book, moreover, the New York branch, like the London

branch, is concerned about mismatch and is subject to guidelines from the home office with respect to the degree of mismatch it may run. One difference, however, is that foreign bank branches in New York, like domestic U.S. banks, make a lot of variable-rate loans, so mismatch on their books can't be measured or controlled in quite the same way in New York as it can be in London.

The United States is the home of the dollar, so having a U.S. branch provides a foreign bank with additional funding and liquidity for its overall Eurodollar operation because the U.S. branch can tap directly into the vast domestic market for dollars. Setting up a U.S. branch also permits a foreign bank to establish an entity to which other branches in the bank's international network can turn to make adjustments in their dollar books; for example, if one of the bank's non-New York branches was getting short-term dollar deposits but had to fund longer-term dollar loans, it might ask the New York branch to lay off its short-term deposits and buy it longer-term money.

A final way in which foreign banks currently enter the U.S. market is by buying U.S. banks, something which has been a feature of the U.S. banking industry in recent years. Foreign acquisitions of U.S. banks follow a trend common in other industries. Managers of large foreign firms and of large foreign pension and other funds view the United States as an attractive place in which to invest and diversify because—as compared to other countries—the United States ranks high in terms of economic and political stability and in terms of potential for continued economic growth.

INTERNATIONAL BANKING FACILITIES (IBFs)

On June 18, 1981, the board of governors of the Federal Reserve approved establishment of *International Banking Facilities (IBFs)* beginning December 3 of that year in order to give state legislatures time to revise tax and banking laws. Domestic banks and foreign bank branches in New York and 11 other states that had passed enabling legislation were then permitted to open IBFs. The hope in New York was that introduction of these facilities would put New York on a par with London as an international banking center; the chance of this occurring, however, was diminished by restrictions the Fed imposed on IBF activities. Federal Reserve data indicate that while some inroads were made, London remained far ahead. It is notable, for example, that at the end of 2005, IBFs accounted for only about 12% of the assets of U.S. branches and agencies of foreign

banks, or \$159 billion.¹⁷ These are small numbers when put in the context of the amount of international assets that are deposited in London.

The concept behind IBFs is to create a species of free trade zone for international money—primarily Eurodollars. An IBF offers a bank several advantages: deposits in the facility are subject to no reserve requirements, and the IBF need not pay FDIC insurance premiums; also, income earned by the facility enjoys, in New York and certain other states, special provisions for relief from state taxes.

For depositors, one attraction of IBFs is that any interest they pay to foreigners is exempt from withholding taxes; another advantage is that the depositor will get U.S., as opposed to U.K., Japan, or some other, sovereign risk. U.S. sovereign risk won't attract rogue depositors, but it should attract institutions that are loath to place funds in the shell branches that major U.S. banks have opened in the Caribbean banking centers and other tax havens because they don't like the sovereign risk that they perceive attaches to deposits there.

The origin of IBFs goes back to the days when New York City was tottering on the brink of bankruptcy. At the time, the state and the city zeroed in on the banks as the culprits. The city's problems were the banks' fault because the banks kept selling the city's debt whereas they should have told the city it was bankrupt. To add injury to insult, the city and the state raised their tax rates on bank income earned within New York State, and the city topped off its tax hike with a tax surcharge.

The imposition of punitive state and city taxes gave New York banks a tremendous incentive to book international business in offshore tax havens, aka shells, primarily Nassau and Grand Cayman, which are located in a time zone that permits New York banks to deal on the shell's behalf during normal business hours. Once this trend asserted itself and serious defections among New York banks became a distinct possibility, the state passed legislation to permit the creation in New York of IBFs. These were supposed to draw huge amounts of business back from London and the offshore shells to New York City.

For the IBFs to get off the ground, the Fed had to give them its blessing. This was slow in coming because out-of-town banks opposed New York IBFs as unfair competition. The Fed has a history of not making rules that

¹⁷ These data were obtained from page 70 of the Federal Reserve's *Statistical Supplement to the Federal Reserve Bulletin*, May 2006.

favor a particular group of banks; to permit the New York IBFs to go ahead, it had to come up with a rationalization which was that any state could pass the same legislation New York had. A second concern of the Fed was with leakage: the movement of domestic deposits and loan business into the Eurodollar market. The Fed feared that further leakage would weaken its control over domestic credit and the domestic money supply.

This concern sounds legitimate, but, in fact, it is somewhat ludicrous since the horse in question left the barn years ago. Today, treasurers at major domestic corporations actively and freely ferry their loan and deposit business between the domestic and the Eurodollar markets on the basis of what best suits their needs. Corporate America certainly hasn't shown the same concern as the Fed, since it now buys a large chunk of the Eurodollar CDs issued in London.

Despite the fact that leakage has become a torrent, the Fed—to prevent its further growth—imposed severe restrictions on what IBFs may do; specifically, it ruled that IBFs could not pay interest on overnight money or issue CDs or take deposits from or make loans to domestic entities. These restrictions sharply limited the value of IBFs to banks. No corporate depositor will settle for a two-day notice account when it can earn interest on a Eurodollar call account at a London or Caribbean branch. Also, corporate treasurers will not make time deposits with IBFs when they can buy liquid Eurodollar paper in London. Today, IBFs may offer foreign nonbank residents large denomination time deposits subject to a minimum notice of two business days before withdrawal. Foreign banking firms and official institutions may place overnight funds with IBFs. Foreign nonbank corporations must acknowledge in writing the Federal Reserve Board's policy that funds deposited in, or borrowed from, an IBF must be used only to support the non-U.S. operations of IBFs. The nonbank deposits at an IBF must be at least \$100,000. Likewise, minimum withdrawals are set at \$100,000.¹⁸

Relatively bereft of corporate deposits, with only \$7.39 billion of corporate deposits held at the end of 2005 out of \$91 billion in total deposits, IBFs have had to rely for most of their funding on the interbank market for Eurodollars and on deposits from central banks that have large dollar holdings and that, because they wanted to diversify their sovereign risk,

¹⁸ Obtained from the Federal Reserve Bank of New York's Web site, www.ny.frb.org/aboutthefed/fedpoint/fed34.html. Commentary written in August 2004.

were already holding some dollar deposits in the United States. At the end of 2005, foreign governments and official institutions (including foreign central banks), and banks in foreign countries each accounted for a little more than a third of all IBF deposits. This contrasts sharply with the situation at U.S. banks' Caribbean branches where a substantial portion of the funding comes from U.S. depositors. The restrictions imposed by the Fed on IBFs have been sufficiently stringent to make New York unattractive compared with London and other Eurodollar centers.

Nonetheless, since IBFs were permitted, every major New York bank and a large number of foreign banks with New York branches or agencies have opened such a facility. As of June 2004, there were 263 IBFs established, 155 of them in New York State. Of the total, 189 were opened by branches and agencies, 64 by banks and savings and loan associations, and 5 by Edge Act corporations.

Running an IBF Book Today

A U.S. bank will try to generate as much profit in its IBF as possible because it pays less taxes on profits earned there. However, a bank's IBF operates at a funding disadvantage. It cannot tap into, either directly or indirectly, the cheapest sources of funding which are issuing negotiable instruments such as deposit notes and commercial paper in the United States, and Eurodollar CDs in London. In particular, a bank's IBF cannot obtain, as can the bank's Cayman branch, deposits from the holding company of cheap funds that the branch has raised in the commercial paper market; the reason is that the holding company is a U.S. corporation.

The funding disadvantage at which a bank's IBF operates has severely constrained the growth of such books compared to Cayman branches, which held \$900 billion in deposits at the end of 2005.

U.S. banks tend to use their IBFs for limited purposes so that the impact of their funding disadvantage is minimized. One such use is to book cross-currency swaps in an IBF, for example, a swap of floating-rate dollars against fixed-rate sterling (or fixed-rate in some other foreign currency). A swap, being an off-balance sheet instrument, requires no funding.

Another activity that some banks carry out in their IBFs is the running of opportunistic books in major foreign currencies. Here, "opportunistic" means, as one banker put it, "When something happens, we open a book, play the market, and then close the book." An IBF is at less of a disadvantage when it funds assets denominated in a foreign currency—often these

assets are readily available securities—than when it funds dollar assets; there is less of a difference between Eurodollar time-deposit and Eurodollar CD rates in foreign currencies than in Eurodollars because, in most foreign currencies, few Euro CDs are issued. Also, a bank that has privileged access to Eurodollar funding can capture some of that funding advantage for its IBF by buying Eurodollar time deposits at sub-LIBOR rates and then swapping those deposits into foreign exchange, say euros, to create euro funding at 2 or 3 bp below LIBOR (for euros); in the swap, the bank loses some of its funding advantage in dollars because of friction costs.

If the day ever comes when IBFs are permitted to issue negotiable instruments that carry a provision that they cannot be placed with U.S. corporations, the IBF business will presumably grow stronger than it has in the past.

REVIEW IN BRIEF

- One of the fastest growing and most vital and important capitalist institutions has been the international capital market known as the *Eurodollar market*.
- *Eurodollars* are dollars held on deposit in a bank or bank branch located outside the United States or in an international banking facility. Eurodollars should not be confused with Europe's currency, the euro. The term "Euro" is today a misnomer, standing for any currency held outside of its country of origin.
- Overlooked is the fact that today banks obtain more of their funding from the Eurodollar market than from the fed funds market.
- The Eurodollar market is today being augmented by "Euro" markets of all sorts and in many currencies, particularly since the advent of Europe's currency, the euro, in 1999.
- An important point to make about Eurodollars is that regardless of where they are deposited—London, Singapore, Tokyo, or Brazil—they never leave the United States. Also, they never leave the United States regardless of where they are lent.
- Participants in the Eurodollar market with international experience sometimes refer to the depositing of Eurodollars with another bank as a *placement* of funds.

- In the Eurodollar market, money transfers are made and settled through the New York clearinghouse known as *CHIPS*—an acronym for the computerized Clearing House Interbank Payments System. By the middle of 2006, CHIPS was processing \$1.5 trillion in payments per day.
- London accounts for roughly 25% of all U.S. dollar liabilities in banks located outside the United States. Looking more broadly, London is also the recipient of 35% of all deposits held by global monetary authorities, more than in any other financial center.
- Although London continues to be the largest depository of Eurodollars in the world, more of the money deposited in London is being directed to nonbank borrowers than in years past, particularly to the United States.
- Cross-border bank claims were \$21.110 trillion at the end of 2005, a 17% gain from 2004 when claims increased by \$2.269 trillion, or roughly 15%. These data show the large extent to which monies are placed outside domestic banking systems.
- Although not defined in U.S. federal banking and securities laws, the term *merchant banking* is generally understood to mean *negotiated private equity investment by financial institutions in the unregistered securities of either privately or publicly held companies*.
- Investment banks and commercial banks both engage in merchant banking, generally investing in common stock, and most private equity funding generated by these entities is used for either start-ups or early-stage companies, or to bring large public companies private. In the early 2000s, this was a trend that was particularly evident. The enactment of Gramm-Leach-Bliley in 1999 created new opportunities for merchant banks that were previously restricted under Glass-Steagall.
- Although Gramm-Leach-Bliley has leveled the playing field a bit, British law allows British banks to engage in a much wider range of activities than a U.S. bank may.
- During the 1990s, the Eurobond market grew at a fast pace, with the total amount outstanding at the end of the decade close to \$1 trillion. Eurobond offerings are denominated in many

currencies, although the dollar remains the currency of choice, accounting for about 45% of all Eurobond issuance.

- Rising energy costs have boosted the deposits of oil-exporting nations, commonly known as *petrodollars*. The International Monetary Fund (IMF) estimates that the oil-exporting countries in the Middle East generated roughly \$400 billion in oil export revenues in 2005, up from about \$100 billion in 1999.
- The flow of petrodollars into the world financial system was slow at first, but picked up at the end of 2005 and into 2006, as evidenced by the amount of dollars placed in BIS-reporting banks.
- The use of off-balance sheet items is important to banks dealing in Eurodollars, with banks using a variety of derivatives to hedge risks associated with mismatches in their asset-liability mix.
- Since London is the preeminent center of the Euromarket, a look at financial regulation in the London market seems appropriate. A key point to be made is that regulation of domestic banking has always been far less formal in Great Britain than it has been in the United States or on the Continent.
- International banking facilities (IBFs) allow depository institutions in the United States to offer services to foreign residents and institutions free of some Federal Reserve requirements and some state and local income taxes.
- A question that troubles some Euromarket watchers is: Who is to act as lender of last resort if the market is rattled by some event? This question really involves two separate questions: Who lends if the supply of Eurodollars dries up? Who lends if the solvency of a major bank or group of banks in the Eurodollar market is threatened through bad loans or other losses?

The Treasury and the Federal Agencies

The public debt is a public curse.

*James Madison, the fourth President of the
United States in a letter to Henry Lee,
April 13, 1790*

A national debt, if not excessive, will be to us a national blessing.

*Alexander Hamilton, the first secretary of the Treasury
in a letter to Robert Morris, April 30, 1791*

The single most important issuer of debt in the money market is the U.S. Treasury. It is a market that has evolved to serve many purposes in the functioning of the economy and markets. The Treasury market is closely followed in importance by federal agencies as a group, particularly because of its influence in the housing market.

U.S. GOVERNMENT SECURITIES

At the end of February 2006, the U.S. government had \$8.270 trillion of debt outstanding. As Table 8.1 shows, a little over half the Treasury's outstanding debt is represented by *marketable debt*, which consists of debts that are tradable in the financial markets. About 48% of the Treasury's outstanding debt is represented by *nonmarketable debt* consisting of debts that are *not* tradable in the financial markets. A substantial portion of the nonmarketable debt is owed to the Social Security and disability trust fund, officially dubbed the Old-Age and Survivors Disability Insurance

TABLE 8.1

Summary of Treasury securities outstanding, February 28, 2006 (in millions of dollars)

Title	Amount Outstanding		Totals (\$)
	Debt Held by the Public (\$)	Intragovernmental Holdings (\$)	
Marketable:			
Bills	997,284	2,277	999,561
Notes	2,390,260	1,482	2,391,742
Bonds	526,498	218	526,716
Treasury inflation-protected securities	345,431	120	345,551
Federal financing bank	0	14,000	14,000
Total marketable	4,259,473	18,098	4,277,570
Nonmarketable:			
Domestic series	29,995	0	29,995
Foreign series	3,586	0	3,586
R.E.A. series	1	0	1
State and local government series	234,545	0	234,545
U.S. savings securities	205,901	0	205,901
Government account series	32,414	3,480,671	3,513,085
Other	5,203	0	5,203
Total nonmarketable	511,644	3,480,671	3,992,315
Total public debt outstanding	4,771,117	3,498,769	8,269,886

Source: U.S. Treasury Department

Trust Fund. The Treasury also issues debts in the form of savings bonds to state and local governments.¹

Currently the Treasury issues four types of marketable securities:

1. Non-interest-bearing *bills* that have an original maturity of six months or less.
2. Interest-bearing *notes* that have an original maturity of 2 to 10 years. Interest is paid semiannually.

¹ The reason the Treasury issues special debt series to state and local governments is explained later in this chapter.

3. Interest-bearing *bonds* that have an original maturity of more than 10 years. Interest is paid semiannually.
4. Interest-bearing *notes and bonds whose principal is indexed to the consumer price index (CPI)*. Maturities range from 5 to 30 years. Interest is paid semiannually.

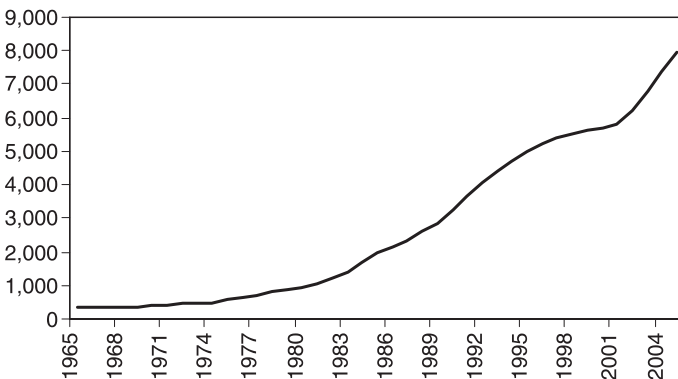
Nonmarketable debt securities include all Treasury securities that cannot be traded in the secondary market after their initial purchase. The two main types of nonmarketable debt other than intragovernmental holdings are savings bonds and state and local government series bonds, commonly known as SLUGS. There were \$206 billion of savings bonds outstanding at the end of February 2006, and there were \$234 billion of SLUGS. Other types of nonmarketable debt and their amounts outstanding in early 2006 are domestic series bonds (\$30 billion), foreign series bonds (\$3.6 billion), and Rural Electrification Administration (REA) series bonds (\$1 million).

VOLUME OUTSTANDING

A huge expansion has occurred over the years in total Treasury debt outstanding (Figure 8.1). The principal cause of the increase is the federal government's persistence in running yearly budget deficits, except for the

FIGURE 8.1

Total U.S. debt outstanding (in billions of dollars), including publicly traded debt and intragovernmental holdings



Source: U.S. Treasury

period 1998–2001, when the government ran budget surpluses (Table 8.2). The causes of these deficits are many: recessions, peacetime defense buildups, increased entitlement spending, profligate spending, and recently the hurricanes of 2005 and war efforts in the Middle East.

The recent sharp increase in Treasury debt has caused a substantial rise in the amount of marketable Treasury securities outstanding (Figure 8.2). Most of this rise has occurred as a result of increases in the amounts of notes and bills outstanding. Negotiable bonds represent the smallest component of the Treasury's total marketable debt, as is implied in Figure 8.3.

TABLE 8.2

Revenues, outlays, deficits, and surpluses, 1962 to 2005

Year	Revenues	Outlays	Deficit (–) or Surplus
1962	99.7	106.8	–7.1
1963	106.6	111.3	–4.8
1964	112.6	118.5	–5.9
1965	116.8	118.2	–1.4
1966	130.8	134.5	–3.7
1967	148.8	157.5	–8.6
1968	153.0	178.1	–25.2
1969	186.9	183.6	3.2
1970	192.8	195.6	–2.8
1971	187.1	210.2	–23.0
1972	207.3	230.7	–23.4
1973	230.8	245.7	–14.9
1974	263.2	269.4	–6.1
1975	279.1	332.3	–53.2
1976	298.1	371.8	–73.7
1977	355.6	409.2	–53.7
1978	399.6	458.7	–59.2
1979	463.3	504.0	–40.7
1980	517.1	590.9	–73.8
1981	599.3	678.2	–79.0
1982	617.8	745.7	–128.0
1983	600.6	808.4	–207.8
1984	666.5	851.9	–185.4
1985	734.1	946.4	–212.3

TABLE 8.2—cont'd

Revenues, outlays, deficits, and surpluses, 1962 to 2005

Year	Revenues	Outlays	Deficit (⇒) or Surplus
1986	769.2	990.4	-221.2
1987	854.4	1,004.1	-149.7
1988	909.3	1,064.5	-155.2
1989	991.2	1,143.8	-152.6
1990	1,032.1	1,253.1	-221.0
1991	1,055.1	1,324.3	-269.2
1992	1,091.3	1,381.6	-290.3
1993	1,154.5	1,409.5	-255.1
1994	1,258.7	1,461.9	-203.2
1995	1,351.9	1,515.9	-164.0
1996	1,453.2	1,560.6	-107.4
1997	1,579.4	1,601.3	-21.9
1998	1,722.0	1,652.7	69.3
1999	1,827.6	1,702.0	125.6
2000	2,025.5	1,789.2	236.2
2001	1,991.4	1,863.2	128.2
2002	1,853.4	2,011.2	-157.8
2003	1,782.5	2,160.1	-377.6
2004	1,880.3	2,293.0	-412.7
2005	2,153.9	2,472.2	-318.3

Note: Under provisions of the Congressional Budget Act of 1974, the fiscal year for the federal government shifted beginning with fiscal year 1977. Through fiscal year 1976, the fiscal year ran from July 1 through June 30; starting in October 1976 (fiscal year 1977), the fiscal year ran from October 1 through September 30. The 3-month period from July 1, 1976, through September 30, 1976, is a separate fiscal period known as the *transition quarter*.

Source: Congressional Budget Office

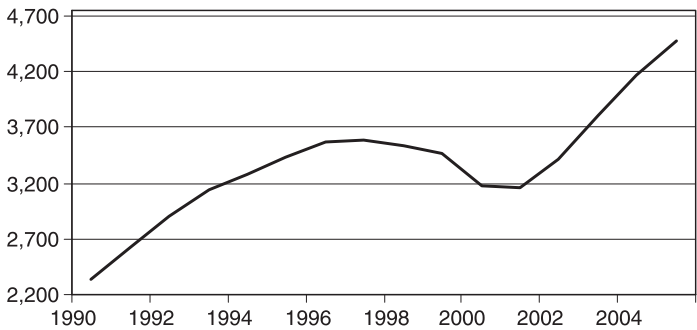
TREASURY DEBT MANAGEMENT: SOME HISTORY

Many of the U.S. Treasury Department's current policy goals were established by its first secretary of the Treasury, Alexander Hamilton, who was appointed in 1779 following the ratification of the Constitution. Three of these goals were contained in Hamilton's *First Report on the Public Credit*:

1. Achieving the lowest possible debt service cost.
2. Ensuring access to unlimited credit in times of war or emergencies.
3. Promoting efficient capital markets.

FIGURE 8.2

U.S. publicly traded debt outstanding (in billions of dollars)



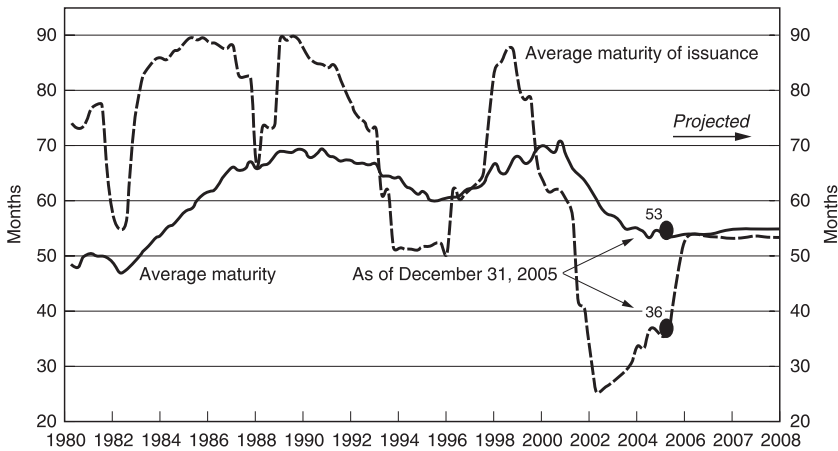
Source: Federal Reserve

Regarding the first two goals, Hamilton said:

And as, on one hand, the necessity for borrowing in particular emergencies cannot be doubted, so, on the other hand, it is equally evident that, to be able to borrow upon good terms, it is essential that the credit of the nation should be well established.

FIGURE 8.3

Average maturity of U.S. Treasuries outstanding



Note: Projections are based on current OMB MSR budget estimates, except for Treasury's internal FY 2006 estimate. Future residual financing needs are spread proportionally across auctioned securities to maintain constant maturity of issuance.

Source: U.S. Treasury Department

For, when the credit of a country is in any degree questionable, it never fails to give an extravagant premium, in one shape or another, upon all the loans it has occasion to make. Nor does the evil end here; the same disadvantage must be sustained on whatever is to be bought on terms of future payment.

From this constant necessity of borrowing and buying dear, it is easy to conceive how immensely the expenses of a nation, in a course of time, will be augmented by an unsound state of public credit.²

Hamilton's plan was approved by the Congress. Hamilton explicitly endorsed two of the five principles that still guide debt management at the Treasury Department, and he implicitly embraced the other three through his policies and his actions:

1. Maintaining risk-free status.
2. Using unitary financing.
3. Promoting market liquidity.
4. Maintaining consistent and predictable issuance.
5. Financing across the yield curve.³

Each of these principles is today a major factor behind the unique position held by U.S. Treasuries as the most important financial instrument in the global financial markets.

Net Debt versus Gross Debt

For many years there has been a great deal of debate about the proper definition of federal debt. Those who believe that the United States is overextended tend to focus on its *gross debt*, while the rest tend to focus on *net debt*. Gross debt refers to all the government's debts, which include marketable and nonmarketable debt securities. Net debt refers only to marketable debt securities.

There is in fact a major difference between the two. Marketable securities such as U.S. Treasuries are legally binding commitments that cannot be broken. In contrast, the U.S. government is both the creditor and

² Alexander Hamilton, "First Report on the Public Credit," in *The Works of Alexander Hamilton*, vol. 2, Henry Cabot Lodge, editor (New York: Haskell House Publishers, 1971), 2:228–2:229

³ Adopted from a study by the Joint Economic Committee titled "Federal Debt: Market Structure and Economic Uses for U.S. Treasury Debt Securities," August 2001.

the debtor for Treasuries held in intragovernmental accounts. These securities exist only in the bookkeeping sense, and they have no direct impact on the financial markets or the economy. There are some who disagree with this, arguing that the nation's gross debt includes obligations to its senior citizens, for example, and therefore represents a true measure of its debt.

Recent Decades

Over the past few decades, the Treasury has made substantial changes in the types of marketable securities it offers and in the way it sells these securities. These changes were made in response to several pressures: the Treasury's need to be able to market its debt in the face of increasingly volatile interest rates, its need to be able to market rapidly growing amounts of debt, and its need to issue securities that would face up to the growing challenge of competing for capital in the United States and abroad.

In the mid-1960s, the Treasury funded the debt by selling 3-month and 6-month bills at weekly auctions and 9-month and 1-year bills at monthly auctions; in addition, there was a quarterly financing in the middle of each quarter at which the Treasury sold notes and bonds. The bills were sold, as they are today, through auctions; the notes and bonds, through exchange and subscription offerings.

Bill Auctions

In a bill auction, banks, dealers, and other institutional investors who buy big amounts of bills submit *competitive* bids; that is, for the bills they want to buy, they bid a discounted price expressed on the basis of 100. For example, a dealer who wanted to buy \$100 million of 3-month bills might bid a price of 98.8625, which is equivalent to a yield of 4.50 on a discount basis.⁴ The prices dealers and investors bid for bills depend both on the rates yielded by outstanding money market instruments and on what (if any) movement they think is occurring in short-term rates.

The less expert investor who is not prepared to work out a bid to three decimal points can put in a *noncompetitive* bid that states no price.

⁴ Rearranging the formula, $D = F \left(\frac{d \times t}{360} \right)$ which was given in Chapter 4, we get $d = \frac{D \times 360}{F \times t}$. In

the above example, D equals \$1.1375 per \$100 of face value, and t equals 91 (13 weeks $\times$ 7 days per week). Thus, $d = \frac{1.1375 \times 360}{100 \times 91} = 4.50\%$

Noncompetitive bids are limited to \$5 million and are usually due before noon (ET) on the day of an auction. We discuss the auction process in greater depth in Chapter 14.

Exchange Offerings

When the Treasury sold bonds through exchange offerings, it used two techniques. In a *straight exchange offer*, the Treasury sought to refund maturing securities by offering its holders new securities with the same par value. In an *advance refunding or pre-refunding*, the Treasury offered holders of an outstanding issue the opportunity to exchange their securities for new securities of the same par value before maturity.

Holders of eligible securities who did not wish to invest in the new issue could sell their *right* to the new issue to other investors or turn in their maturing securities for cash. The purpose of straight exchange offerings was to encourage existing bondholders to roll their bonds, thereby permitting Treasury refundings to be carried out with minimal disruption to the market. In the case of pre-refundings, an additional objective was to reduce Treasury borrowing costs by taking advantage of the interest-rate cycle; the Treasury would pre-refund when interest rates were expected to rise, and pre-refunding looked cheaper than refunding at maturity. Exchange offerings were usually made on generous terms so that issues for which exchange offerings were made rose in value, reflecting the *rights* value they acquired through the exchange offering. The practice of exchange offerings also led to speculative demand for issues that were considered likely candidates for pre-refunding.

Subscription Issues

In a subscription offering, the Treasury set the maturity date and coupon rate of a new issue, announced how much of the security it wanted to sell, and invited public subscriptions at a fixed price. It typically announced that it would accept all subscriptions for amounts below some stated threshold and that it would allocate the remaining notes or bonds to larger subscribers in proportion to the amounts sought. For example, on July 31, 1968, the Treasury announced that it would sell approximately \$5.1 billion of 5½% notes maturing on August 15, 1974, at a price of 99.62% of principal. The subscription books would be open for a single day, on August 5; subscriptions for \$250,000 or less would be filled in full, and the notes would be issued on August 15. The Treasury received subscriptions for \$23.5 billion, 4.6 times the amount offered. Subscriptions for more than

\$250,000 were allotted 18% of the amounts subscribed for, subject to a minimum allocation of \$250,000.

Before setting the terms of an offering, Treasury officials consulted with banks, insurance companies, and securities dealers to assess the prospective demand for notes and bonds of different maturities and to identify the yield needed to sell a given amount of a particular issue. The Treasury set the coupon rate on a new issue to the nearest one-eighth of a percent below the intended offering yield and then reduced the offering price below 100 to fine-tune the yield to the desired level.⁵

Many saw the process of setting the terms of an offering as guesswork, chiefly because the Treasury could easily misjudge market demand.

The Rate Lid on Bonds

Today, Congress permits the Treasury to pay whatever rate of return is necessary to sell bills, notes, and bonds, but it once barred the Treasury from paying more than 4.25% on bonds. This rate lid created no problem when long-term rates were below 4.25%. But in the mid-1960s, rates rose above this level, making it impossible for the Treasury to sell new bonds.

In the early 1970s, Congress granted the Treasury permission to sell \$10 billion of bonds exempt from this rate ceiling. Congress raised the amount of this exemption on several occasions but always kept the amount small relative to the Treasury's total marketable debt. Despite its popularity with members of Congress who favored low interest rates, the 4.25% rate lid did nothing to hold down interest rates. It did, however, bar the Treasury from competing directly with private corporations and municipal borrowers in the long-term market and from pulling funds directly out of the mortgage market, which explains why there were opponents to ending the rate lid.

Under the Reagan administration, the question arose as to whether the government should continue to sell long bonds at historically high rates when the then new administration was implementing supply-side economic policies that were supposed to generate economic growth while reducing inflation and interest rates. Then Undersecretary of the Treasury Beryl Sprinkel argued that by selling long bonds carrying coupons in the teens, the government would demonstrate a lack of faith in its own policies and forecasts.

⁵ Kenneth D. Garbade, "The Institutionalization of Treasury Note and Bond Auctions, 1970–1975," *Economic Policy Review*, Federal Reserve Bank of New York, May 2004.

Those who thought that the Treasury should continue to sell long bonds retorted that the Treasury should not seek, as private borrowers do, to pick its spots in issuing long bonds. The Treasury, they argued, is no more able than anyone else to predict the trend in long rates. Second, because of the inevitable cyclical ups and downs in interest rates, the Treasury, which has so much debt maturing all the time anyway, would have ample opportunity to benefit from low rates when they prevailed. Third, the Treasury must finance somewhere; if it financed less in the long market, it would *have to finance more in the short market*, which would run counter to its intent to lengthen the debt. The Treasury could reconcile heavy reliance on short issues with its intent to lengthen the average maturity of the debt only if the government were running surpluses and the size of the debt were declining.

Some academics countered that the Treasury should not be seeking to lengthen the debt. They argued that Congress would act more responsibly to control inflation if it knew that acting irresponsibly would force up the interest cost of the debt immediately. Scoffed one Treasury official: “What Congressman ever thought of next year’s impact on this year’s spending?”

Finally, the rate lid on bonds was removed by Congress in the fourth quarter of 1988.

Introduction of Price Auctions

The fact that, for a period starting in the mid-1960s, the Treasury could not sell long-term bonds left it in the position where the longest-maturity security it could sell was a 5-year note. As a result, the average maturity of the debt began to decline at a disturbing rate (Figure 8.3). To counter this trend, the Treasury sought and received from Congress in 1967 permission to raise the maximum maturity of notes from five to seven years.

As interest rates became more volatile in the late 1960s, it became increasingly difficult for the Treasury to issue new debt through subscription issues on which both the price and the coupon were announced several days before the date on which investors tendered for the issue. In refunding held in November 1970, the Treasury experimented: for the first time, it used a *price auction* instead of the subscription technique to sell new notes and bonds to the general public.

In a price auction, the Treasury announced the amount to be sold to the public, and a few days prior to the auction it set a coupon rate and a minimum acceptable price. Competitive bidders stated the price they were

willing to pay on the basis of 100 to two decimals. These bids could be at par (\$100 per \$100 face), at a price below par (at a discount), or at a price above par (at a premium). The price bid would reflect the investor's judgment as to how attractive the coupon rate compared to other market rates. The rate associated with a price of par was the coupon rate, and paying a premium would result in a lower effective yield than the coupon rate; and buying at a discount would yield an effective return higher than the coupon rate. As in the Treasury bill market, the noncompetitive tenders were subtracted from the amount to be sold, and the remainder was distributed by accepting the highest price bid on down until the amount of the issue was taken. Competitive bidders paid the price that they bid, and noncompetitive bids were accepted in full at the average price of competitive bids. However, since the competitive bids were not necessarily at par, the average price paid by noncompetitive bidders might be more or less than par, and thus they would receive an effective yield somewhat different from the coupon rate.⁶

Here are additional details of the successful price auction of 1970:

Following the close of the subscription books, the Treasury announced (on October 22, 1970) that investors had tendered \$5.3 billion of the maturing securities, leaving \$0.7 billion to be redeemed in cash. However, rather than financing the attrition with a subscription offering, the Treasury announced that it would auction \$2.0 billion of 6¾ percent eighteen-month notes.

The auction was held on November 5 and followed closely the format of a bill auction. In light of the failure of the syndicate auction scheme seven years earlier, the Treasury was careful to remind participants that it was not doing anything novel: "the use of the auction method of sale represents an adaptation of the technique used successfully for many years in marketing Treasury bills" and "bidding and other procedures [will] very closely follow the standard procedures used in regular Treasury bill auctions." Auction participants could submit one or more competitive tenders or a single noncompetitive tender (limited to \$200,000) that would be filled at the average accepted competitive bid. Competitive tenders had to specify a bid price of at least 99.76 percent of principal value and were accepted in order of declining price until all of the notes were accounted for or all of the tenders were filled. Tenders specifying bid prices in excess of the stop-out price received the full amount sought and were invoiced at their respective bid prices. The remaining notes were distributed among those

⁶ Margaret Bedford, "Recent Developments in Treasury Financing Techniques," *Monthly Review*, Federal Reserve Bank of Kansas, July–August 1977, p. 17.

who bid at the stop-out price in proportion to the quantities sought. The Treasury characterized the auction as a “test,” part of a “continuing effort . . . to develop more efficient debt management techniques.”

On November 6, the Treasury announced that it had received tenders for \$5.2 billion of notes—2.6 times the amount offered. It accepted bid prices ranging from 100.93 (to yield 6.09 percent) down to a stop-out price of 100.69 (to yield 6.26 percent), where there was a 32 percent allocation. The average accepted competitive price was 100.76 (to yield 6.21 percent). The Treasury followed up its successful auction of eighteen-month notes with additional auction offerings, but it initially used auctions sparingly and only to sell short-term notes.⁷

Switch to Yield Auctions

In 1973, the Treasury further changed its policies of debt issuance. It again sought and received from Congress permission to raise the maximum maturity on notes, this time from 7 to 10 years. Also, because of its increasing cash needs, it discontinued exchange offerings with the February 1973 refunding and began to rely solely on price auction sales. The Treasury also began to issue 2-year notes on a regular cycle but later discontinued this cycle; it also discontinued issuing 9-month bills because of a lack of investor acceptance of this maturity.

The year 1974, which was characterized by high and volatile interest rates, was a difficult time for the Treasury to sell debt. To ease its problems, the Treasury increased the size of the noncompetitive bids that could be tendered for notes and bonds to \$500,000 in order to appeal to a wide class of investors. It also began to issue occasionally special longer-term bills for nonstandard periods when it needed additional funds.

The final and most important change that the Treasury made in 1974 was to switch its auctions of notes and bonds from a price to a yield basis. Under the price auction system, at the time a new issue was announced, the Treasury set the coupon on the issue in line with market rates so that the new issue's price, determined through auction, would be at or near par. If rates moved away from the levels prevailing on announcement day, the prices bid on auction day would, reflecting this, move away from par. For example, if rates fell between the time of an announcement of an issue and the auction, bid prices would be above par, whereas if rates rose, bids would be below par. As interest rates became more volatile, deviations of

⁷ Garbade, 2004.

bid prices from par became a problem. In August 1974, one Treasury issue was sold at 101 while another failed to sell out because the Treasury received too few bids at or above the minimum price it would accept. The Treasury feared that above-par prices would discourage some bidders and that below-par prices would place purchasers in an unanticipated tax position (the amount of the discount at issue being taxable at maturity as ordinary income). Another problem with price auctions was that, when the Treasury set coupons, the market tended to move to them, so that price auctions disturbed the market. To solve both problems and to ensure that its issues sold out, the Treasury moved in late 1974 to a new technique in which would-be buyers bid *yields* instead of prices.

In a yield auction for notes and bonds, the Treasury announces the new issue a week or more before the auction. At that time, it tells the market what amount of securities it will issue, when they will mature, and what denominations will be available. *Competitive* bidders bid yields to three decimal points (e.g., 4.532%) for specific quantities of the new issue. After bids are received, the Treasury determines the stop-out bid on the basis of both the bids received and the amount it wishes to borrow. It then sets the coupon on the security to the nearest $\frac{1}{8}$ of 1% necessary to make the average price charged to successful bidders equal to 100.00 or less. Once the coupon on the issue is established, each successful bidder is charged a price (discount, par, or premium) for her securities; the price is determined so that the yield to maturity on the securities a bidder gets equals the yield she bid. *Noncompetitive* bidders pay the average price of the accepted competitive tenders.

TABs, Strips, and Cash Management Bills

In 1975, when the Treasury faced the problem of both refunding huge quantities of maturing debt and financing a burgeoning federal debt, it changed its policies of debt issuance.

From time to time, the Treasury finds it necessary to sell special bill issues to meet short-term borrowing needs. Prior to 1975, the Treasury used tax anticipation bills and bill strips for this purpose.

Tax anticipation bills (TABs) were issued in anticipation of future tax receipts, helping the Treasury smooth out its tax receipts. Commercial banks were usually permitted to make payments for TABs by crediting the Treasury's tax and loan accounts, thus making them underwriters for the issuance of TABs. About 28 TAB offerings were made during the 1970–1974 period, and they ranged in maturity from 23 to 273 days.

A *bill strip* is a reopening of a number of issues of outstanding bill series. Strips enabled the Treasury to raise a large amount of short-term funds at one time rather than spreading out receipts through additions to weekly bill auctions. In the 1970–1974 period, nine strips of bills were issued ranging from additions to five series to additions to fifteen series and averaging 22 days to 131 days in maturity.⁸

In 1975, the Treasury discontinued the use of TABs and strips and replaced them with *cash management bills*. Cash management bills often have quite short maturities. When they are auctioned, the minimum acceptable bid is \$1,000 and additional increments are sold in denominations of \$1,000. The maximum acceptable noncompetitive bid is \$5 million. Cash management bills are usually bought by banks and dealers at a yield that is above their cost of money and held to maturity.

Regularization of Debt Issuance

The year 1975 was important in the evolution of debt management policy. In that year, the Treasury adopted a program of *regularization of debt issuance*. Under this program, the Treasury began to issue 2-year, 4-year, and 5-year notes on a regular cycle. A 2-year note was issued at the end of each month; a 4-year note, in the middle of the second month of each quarter; and a 5-year note, in the middle of the first month of each quarter. The normal quarterly refunding, at which the Treasury offers a mix of notes and bonds to refund maturing issues and raise new cash, occurs at the middle of the second month of each quarter. Thus, in the late 1970s, the Treasury was issuing coupons on a regular schedule of six dates a quarter.

The Treasury began its policy of regularizing debt issuance for several reasons. First, in the mid-1970s it was obvious, against a background of large and then record deficits, that the government was going to have huge financing requirements for the foreseeable future. Therefore, Treasury officials concluded that both to minimize the cost of issuing Treasury debt and to maximize the capacity of the market to absorb such debt, it was crucial that debt issuance be made as predictable as possible.

Before the Treasury sought to regularize debt issuance, it operated on a sort of ad hoc basis. It used to be that, at a quarterly financing, the Treasury might come with anything from a 1- to 10-year note or with a long bond if it had authority to sell them. Dealers, never knowing what to

⁸ Bedford, 1977.

expect, had two choices: to come into an auction with a position because they were willing to bet on something or to come in flat (with no position) to avoid risk.

A second reason for regularizing debt issuance was to avoid bunching too much Treasury debt in the quarterly financings. There is a limit on how much debt the market can absorb and dealers can distribute at any time; it was thought that if the Treasury continued to issue most of its coupon debt on four dates a year, that limit would be breached and the Treasury would consequently be forced to pay higher rates than it would have had to pay if bunching were avoided. Under the current program, the market has a chance to digest one issue before it girds up to take another.

A third reason the Treasury began issuing debt on a regular schedule was that doing so was viewed as a means to lengthen the average maturity of marketable Treasury debt outstanding, which had fallen during much of the 1970s until 1977. Since then, the Treasury has made strong efforts to increase the regularization of its debt issuance and now issues securities regularly across the yield curve.

TREASURY DEBT MANAGEMENT TODAY

Treasury officials who are today responsible for debt management are quick to point out that responsibility for making the tax and expenditure decisions that determine the size of the current deficit and of projected deficits belongs to other economic policy makers. As one debt manager once noted, “We are told what the financing requirements of the federal government are going to be. Our job is to decide, based on our market expertise, what is the least disruptive way of handling that financing requirement.”

Focusing on Debt Regularization

In recent years, the Treasury has had to return to the idea of debt regularization following the budget surpluses it ran from 1998 to 2001. During that period, there was much speculation about how to deal with *declining* government debt, and in January 2000 the Treasury announced that it would begin to repurchase its outstanding debt through reverse auctions. The buyback program began in March 2000, and it lasted until April 2002. The Treasury conducted 45 buyback operations ranging in size from \$750 million to \$3 billion, although the vast majority of operations

were between \$1 billion and \$2 billion. The operations ended when the budget deficits looked likely to persist, forcing the Treasury to once again have to alter its debt financing schedule as it had so many times in the past.

For many years, debt management has been a nonpartisan issue. The Treasury's agreed-upon objective has been to get its debt sold in the least expensive and the least disruptive way possible, given the constraints placed on it by external forces in the form of congressional mandates and market conditions and by internally imposed constraints, such as its decision to issue no instrument that would compete directly and favorably with savings deposits at banks and S&Ls.

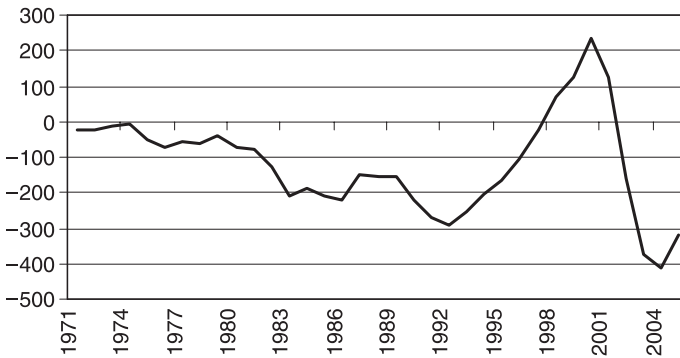
The policy of regularization of Treasury debt issuance, begun in the mid-1970s, has been continued. Over time as the Treasury had more and more debt to finance, it responded by adding more coupon cycles (Table 14.1) and by building up those it already had. To further regularize debt issuance, the Treasury has sought to make its mix of offerings at the quarterly refunding as predictable as possible.

Since debt regularization was adopted, the major focus of debt management has been on decisions concerning coupon issues: which coupons and how much of each to issue? This was inevitable given the huge deficits the federal government was running. Whenever the Treasury must meet a big cash drain, it goes first to the bill market, especially when its cash needs change relatively quickly, as was the case beginning in 2001 (Figure 8.4) when budget surpluses ended in the United States. Ultimately, however, most of the government debt is financed via notes. Continuing deficits would result in an enormous buildup of bill issues if the Treasury made no attempt to expand its coupon issues.

A second objective of debt regularization has been to avoid an undesirable shortening of the average maturity of the debt, which had fallen to 53 months in 2005 compared to 71 months in 2001 (Figure 8.3). A short average debt maturity forces the Treasury to sell an enormous quantity of debt each year just for refunding purposes. It also makes the interest component of federal debt service highly sensitive to the current level of market rates. For example, from 1979 to 1982, the cost of financing the national debt rose by 60% (from \$55.5 billion to \$99.1 billion), while the debt itself rose by only 21%, in part because the short average maturity of the debt forced the Treasury to constantly refund huge sums of maturing debt at ever-increasing rates. The Treasury faced a similar problem beginning in 2004 when the Federal Reserve began a series of interest-rate

FIGURE 8.4

U.S. budget balance (in billions of dollars)



Source: Congressional Budget Office, Stone and McCarthy Research Associates

hikes that lasted into 2006. Suddenly the Treasury had to roll over debt at yields over 5% that it had previously issued at yields as low as 1.08% for 2-year notes.

Debt regularization ought to reduce in several other ways the cost of financing the debt. By reducing uncertainty of the sort that prevailed when the Treasury came to the market on an ad hoc basis, regularization ought to reduce the yields at which dealers and investors are willing to bid for new Treasury issues. It should also decrease borrowing costs because when the Treasury creates a security and keeps selling it, the security creates its own demand after a time. Its rationale is that if portfolio managers know the Treasury is coming with securities on a regular basis, they will adjust their portfolios so that when the new Treasury securities come to market, other fixed-income securities will have been swapped out to make room for them. This supposedly will give the Treasury a share of the market under all conditions—a share that the Treasury can increase when conditions are favorable and rates are low.

In a speech delivered in December 2002 by Timothy S. Bitsberger, the deputy assistant secretary for federal finance at the U.S. Treasury Department, Bitsberger described the importance of issuing Treasury securities on a regular basis:

We issue debt regularly and in predictable quantities, rather than opportunistically. A consequence of regular and predictable issuance is that we

are not in a position to tailor debt issuance to interest rates . . . If Treasury officials were to alter issuance to take advantage of interest rate fluctuations, they would not necessarily lower borrowing costs—any price concessions from exercising market power are likely to be more than offset by your superior resources devoted to understanding interest rate movements and modeling our behavior.

Aside from lacking resources—the office of market finance has no more than four people devoted to debt policy—it is difficult to think of a multi-trillion-dollar-a-year annual issuer of debt as nimble. The sheer scale of our operations dictates a high degree of regularity in issuance. What we have done at Treasury is turn some degree of necessity into a high degree of commitment. So we don't hold snap unscheduled auctions for a given maturity when yields appear low, and we don't even take the yield curve into account when we allocate how much to raise by different maturities. Our issuance calendar is well known to every trader or investor involved in our market . . . we make large entitlement payments at the beginning of months and receive cash sporadically throughout months, with receipts lumped unevenly around only a few tax dates. Part of my job is to figure out how to efficiently manage uneven cash flows with regular debt issuance. Part of the consequence of my advice is huge cash swings in Treasury accounts held in the banking system.

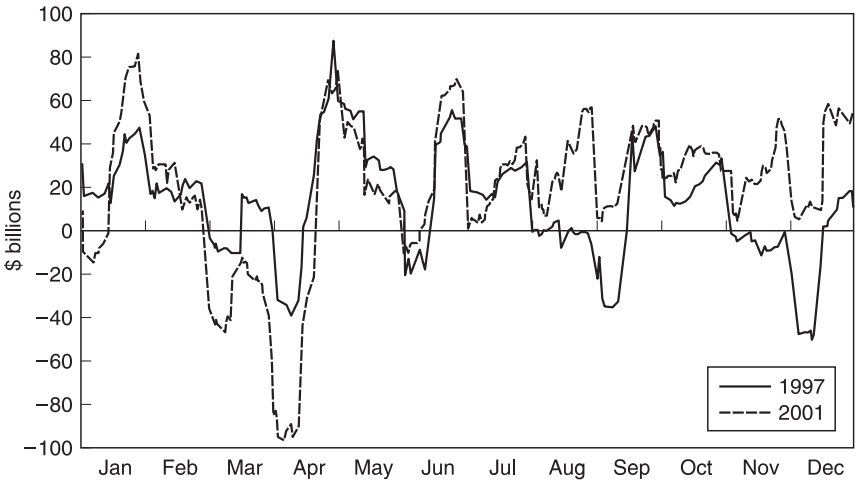
It is not unusual for our cash accounts to swing by more than \$50 billion over the space of a few days. By contrast, if we were to change issuance by more than a few billion from one auction to the next, we would surprise market participants. Our situation is further constrained by Treasury's strict collateral requirements with the banks that hold our cash balances. Constraints, however, do not alter our objective: the better we can manage our cash balances, the better we can serve the taxpayer . . . Uncertainty about the future also constrains debt management planning. We have to be prepared to finance either sustained surpluses or deficits. The range of potential fiscal outcomes is pretty remarkable . . . The average miss on the current year of forecasting, and this includes street economists, CBO and OMB—and I repeat—the average miss on the current year after four months of actuals is \$75B.⁹

Figure 8.5 shows the large variability that tends to exist in the Treasury's daily cash balances. Similarly, Figure 8.6 shows the wide range of possible outcomes that could occur with respect to the U.S. budget

⁹ Timothy S. Bitsberger in remarks delivered to The Fixed Income Summit in Palm Beach, Florida, on December 4, 2002, adapted from the Treasury Department's Web site.

FIGURE 8.5

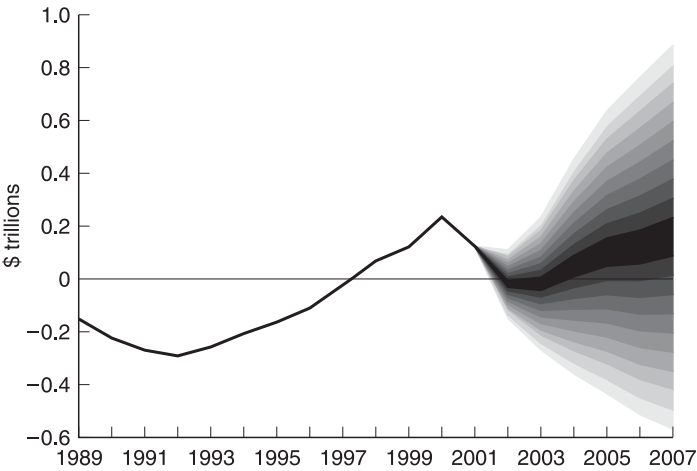
Average daily cash balances (excluding cash management bills) tend to be volatile at the Treasury



Source: U.S. Treasury Department

FIGURE 8.6

The many outcomes of possible U.S. budget balances



Source: U.S. Treasury Department, Congressional Budget Office

situation, based on past outcomes. Both charts illustrate the importance of issuing debt on a regular basis.

Transparency in the Issuance Calendar

The U.S. Treasury regularly meets with the Treasury Borrowing Advisory Committee of the Bond Market Association, a group established by Treasury statute that consists largely of primary dealers, investment management firms, and major commercial banks. The Treasury also meets with the Primary Dealers Committee of the Bond Market Association, which is composed of senior officials identified by the Federal Reserve Bank of New York as primary dealers. Both committees often give advice about how the Treasury should structure its issuance calendar, and the Treasury often seeks out the Committee's advice, although it doesn't always heed it. For example, the Treasury Department decided to end its issuance of 30-year bonds in 2001 despite recommendations to the contrary by the Primary Dealers Committee. That decision, which was announced in early 2001, took the Street by surprise, as evidenced by the very sharp gains in bond prices that followed the announcement. Nevertheless, in general the open dialogue between the Street and the Treasury Department creates a bit more clarity about the issuance calendar, although there are never really any certainties about issuance, even to those who make the issuance decisions.

The Benchmark Status of U.S. Treasury Securities

Regularization of Treasury issuance has played an important role in creating *benchmark* status for U.S. Treasury securities. Treasuries are seen as a benchmark for a variety of different reasons, although the reasons vary depending upon how the Treasuries are used by market participants. For example, many portfolio managers use Treasuries as a benchmark to judge the performance of their portfolios. Others use Treasuries as a gauge of the risk-free rate of return, which can be used to price other issues based on a comparison of credit quality of these issues relative to Treasuries. Treasuries are also used as a hedging benchmark against other segments of the fixed-income market and as a reserve asset for many of the world's central banks.

Of course, the Treasury market's benchmark status wouldn't be possible without its backing by the full faith and credit of the U.S. government. The backing is what gives Treasuries the risk-free quality investors seek in a benchmark. Other qualities that contribute to the benchmark status of Treasuries include their large supply and active trading volume. This is evidenced by the roughly \$4.3 trillion in Treasuries that were outstanding in early 2006, and the roughly \$600 billion of Treasuries that were trading daily at that time.

Economic Uses of Treasuries

As noted above, Treasuries are used for a variety of purposes other than as pure investments. One of these is for the *financing* of Wall Street's large holdings of fixed-income securities. The Street's primary dealers finance their holdings via repurchase agreements (repos), which are essentially short-term loans secured by collateral deemed safe and liquid—usually Treasuries. The repo market is very large, with roughly \$3.7 trillion outstanding in early 2006, the vast majority of which was backed by U.S. Treasuries.

Treasuries are also used for *hedging* and *speculation*. Most interest-rate hedges utilize Treasuries; for example, underwriters of corporate securities sometimes sell Treasuries to hedge the interest-rate risks associated with the issuance of new securities. Speculators use Treasury options and futures to speculate on changes in interest rates as well as to bet on changes in the shape of the Treasury yield curve and on the interest-rate spread between Treasuries and other fixed-income securities. In April 2006, for example, there were over 2 million 10-year Treasury futures contracts outstanding carrying a notional value of over \$200 billion (2 million contracts $\times$ \$100,000 of notional value per contract). No other futures contract on any other fixed-income security comes close. For example, the number of federal agency futures outstanding is scant at only a few thousand contracts.

Many *loans* granted to both individuals and businesses are tied to Treasury yields. For example, many adjustable-rate mortgages are priced against Treasury yields. Some agricultural loans are tied to Treasury yields, such as those issued by the Farm Service Agency (FSA), which makes variable interest rate and ownership loans to farmers who are temporarily unable to obtain private credit on commercial terms. Operating loans to ordinary farmers for one and seven years are tied to the 5-year

constant maturity yield plus not more than 1%.¹⁰ Most federal student loans are linked to Treasuries, carrying a variable interest rate that is indexed to the 3-month T-bill.

Treasuries are used for a variety of *regulatory purposes*. For example, many banks hold Treasuries to help fulfill their capital adequacy requirements as set forth by the Basel Capital Accord, which made capital requirements more sensitive to differences in risk profiles among banking organizations. Under the accord, bank supervisors in each BIS country (countries whose central bank is a member of the Bank for International Settlements) calculate a bank's capital adequacy ratio by adding common stockholders' equity to certain other items, assigning a risk weight to all of a bank's assets and off-balance sheet items, summing these weights to calculate a bank's risk-based assets, and dividing a bank's capital by its risk-based assets.

Under the accord, claims against or guaranteed by the full faith and credit of the United States or the central government of an Organization for Economic Cooperation and Development (OECD) member country are given a zero weight. In contrast, claims on other U.S. depository institutions and OECD banks, claims on or guaranteed by the full faith and credit of U.S. state and local governments or subsidiary governments in other OECD countries, claims on or guaranteed by the official multilateral lending institutions or regional development banks, claims on or guaranteed by U.S. government-sponsored agencies, and mortgage-backed securities issued by U.S. government-sponsored agencies are given a 20 percent weight.¹¹ The zero weight assigned to Treasuries means that banks can finance their purchases of Treasuries entirely with debt, whereas they would have to *add* new equity or other qualified capital to their balance sheets when acquiring other assets, including loans.

Pension funds use Treasuries to balance their long-term assets and liabilities and as a form of liquid investment that can be easily sold to meet their cash needs. The Employee Retirement Income Security Act (ERISA) mandates that the Pension Benefit Guaranty Corporation (PBGC) use Treasuries to determine the funding adequacy of private employer-sponsored defined-benefit pension plans, as well as other important metrics. Pension funds held \$94 billion in Treasuries at the end of 2005.

¹⁰ Michael J. Fleming, "Financial Market Implications of Federal Debt Paydown," *Brookings Papers on Economic Activities*, Fall 2000, p. 225.

¹¹ Adopted from a study by the Joint Economic Committee titled "Federal Debt: Market Structure and Economic Uses for U.S. Treasury Debt Securities," August 2001, pp. 30–31.

Capacity of the Market to Absorb Treasury Debt

The constantly increasing amount of Treasury debt outstanding and the volatility at times of rates have caused some to wonder if Treasury debt issuance might at some point breach the limit on the amount of Treasury debt dealers are able to underwrite or on the amount investors are willing to absorb. So far, Treasury officials have seen no signs that either eventuality is occurring. As one Treasury official once noted, “Rate volatility helps make the market because traders make more money when markets are volatile than when they are not. Certainly, we have had no problem with coverage in auctions, and there seems to be no shortage of capital to back auction bids.”

The Treasury has also had no difficulty finding sufficient investors to buy its debt, though the mix of investors tends to change from period to period (Table 8.3). The most recent period has been characterized by a high level of net foreign buying for example, with foreign investors holding \$2.187 trillion of Treasury securities at the end of January 2006, about half of the amount outstanding, up from about 35% five years earlier.

These observations raise two interesting questions: Thanks to budget deficits, is the United States really going broke? And are foreigners acquiring a vast horde of Treasuries that we or some future generation will have, with great pain, to repay? Put another way: Are things really as bad as the press makes them out to be? These are questions that have been posed for two decades, yet there has never been any real threat of these fears becoming a reality. Debts and deficits do matter to investors, but they appear to matter less than the doomsayers think. It seems that debts and deficits are bigger problems for countries with either a poor fiscal history or a weak economic infrastructure than for countries such as the United States, which has a long history of strong economic performance, a mature legal and political infrastructure, and a relatively good history of fiscal prudence. There are many who disagree with the idea that debts and deficits are ignored by markets. In a 2003 study, Laubach concludes that a 1 percentage point increase in the projected deficit-to-GDP ratio boosts long-term interest rates by roughly 25 basis points.¹²

Evidence on the low importance that investors place on debts and deficits as a determinant of yields on government securities in mature economies is apparent in the behavior of Japanese government bonds in

¹² Thomas Laubach, “New Evidence on the Interest Rate Effects of Budget Deficits and Debt,” Working Papers Series, Board of Governors of the Federal Reserve System, May 2003.

TABLE 8.3

Estimated ownership of U.S. Treasury securities (in billions of dollars)

End of Month	Total Public Debt ¹ (1)	Federal Reserve and Government Accounts ² (2)	Total Privately Held (3)	Depository Institutions ^{3,4} (4)	U.S. Savings Bonds ⁵ (5)	<i>Pension Funds³</i>		Insurance Companies ³ (8)	Mutual Funds ^{3,7} (9)	State and Local Governments ³ (10)	Foreign and International ⁸ (11)	Other Investors ⁹ (12)
						Private ⁶ (6)	State and Local Governments (7)					
1995 - Mar	4,864.1	1,619.3	3,244.8	353.0	181.4	141.8	225.0	244.2	210.6	350.5	707.0	831.4
June	4,951.4	1,690.1	3,261.3	340.0	182.6	142.7	217.2	245.0	202.5	313.7	762.5	855.2
Sept	4,974.0	1,688.0	3,286.0	330.8	183.5	142.1	211.3	245.2	211.6	304.3	820.4	836.8
Dec	4,988.7	1,681.0	3,307.7	315.4	185.0	142.9	208.2	241.5	225.1	289.8	835.2	864.6
1996 - Mar	5,117.8	1,731.1	3,386.7	322.1	185.8	144.5	213.5	239.4	240.9	283.6	908.1	848.7
June	5,161.1	1,806.7	3,354.4	318.7	186.5	144.8	221.1	229.5	230.6	283.3	929.7	810.3
Sept	5,224.8	1,831.6	3,393.2	310.9	186.8	141.5	213.4	226.8	226.8	263.7	993.4	829.9
Dec	5,323.2	1,892.0	3,431.2	296.6	187.0	140.2	212.8	214.1	227.4	257.0	1,102.1	794.0
1997 - Mar	5,380.9	1,928.7	3,452.2	317.3	186.5	141.7	211.1	181.8	221.9	248.1	1,157.6	786.2
June	5,376.2	1,998.9	3,377.3	300.1	186.3	142.2	214.9	183.1	216.8	243.3	1,182.7	707.8
Sept	5,413.1	2,011.5	3,401.6	292.8	186.2	143.2	223.5	186.8	221.6	235.2	1,230.5	681.7
Dec	5,502.4	2,087.8	3,414.6	300.3	186.5	144.4	219.0	176.6	232.4	239.3	1,241.6	674.5
1998 - Mar	5,542.4	2,104.9	3,437.5	308.3	186.2	136.9	212.1	169.4	234.7	238.1	1,250.5	701.2
June	5,547.9	2,198.6	3,349.3	290.9	186.0	129.9	213.2	160.6	230.7	258.5	1,256.0	623.4
Sept	5,526.2	2,213.0	3,313.2	244.4	186.0	121.5	207.8	151.3	231.8	271.8	1,224.2	674.3
Dec	5,614.2	2,280.2	3,334.0	237.4	186.6	113.6	212.6	141.7	253.5	280.8	1,278.7	629.2

Continued

TABLE 8.3—cont'd

Estimated ownership of U.S. Treasury securities (in billions of dollars)

End of Month	Total Public Debt ¹ (1)	Federal Reserve and Government Accounts ² (2)	Total Privately Held (3)	Depository Institutions ^{3,4} (4)	U.S. Savings Bonds ⁵ (5)	<i>Pension Funds³</i>		Insurance Companies ³ (8)	Mutual Funds ^{3,7} (9)	State and Local Governments ³ (10)	Foreign and International ⁸ (11)	Other Investors ⁹ (12)
						Private ⁶ (6)	State and Local Governments ³ (7)					
1999 - Mar	5,651.6	2,324.1	3,327.5	247.4	186.5	110.8	211.5	137.5	254.0	288.6	1,272.3	619.0
June	5,638.8	2,439.6	3,199.2	240.6	186.5	114.1	213.8	133.6	227.9	298.8	1,258.8	525.1
Sept	5,656.3	2,480.9	3,175.4	241.2	186.2	117.2	204.8	128.0	224.4	299.6	1,281.4	492.6
Dec	5,776.1	2,542.2	3,233.9	248.6	186.4	118.9	198.8	123.4	228.7	305.1	1,268.7	555.3
2000 - Mar	5,773.4	2,590.6	3,182.8	237.7	185.3	114.7	196.9	120.0	222.2	307.1	1,106.9	691.9
June	5,685.9	2,698.6	2,987.3	222.2	184.6	115.3	194.9	116.5	204.5	310.1	1,082.0	557.2
Sept	5,674.2	2,737.9	2,936.3	220.5	184.3	115.2	185.5	113.7	205.7	308.7	1,057.9	544.8
Dec	5,662.2	2,781.8	2,880.4	201.5	184.8	113.7	179.1	110.2	221.8	310.9	1,034.2	524.3
2001 - Mar	5,773.7	2,880.9	2,892.8	188.0	184.8	115.6	177.3	109.1	221.8	317.9	1,029.9	548.4
June	5,726.8	3,004.2	2,722.6	188.1	185.5	116.3	183.1	108.1	218.7	325.7	1,000.5	396.8
Sept	5,807.5	3,027.8	2,779.7	189.1	186.4	119.7	166.8	106.8	232.5	321.9	1,005.5	450.9
Dec	5,943.4	3,123.9	2,819.5	181.5	190.3	121.1	155.1	105.7	259.4	329.3	1,051.2	426.1
2002 - Mar	6,006.0	3,156.8	2,849.2	187.6	191.9	123.7	163.3	114.0	266.0	328.7	1,067.1	407.0
June	6,126.5	3,276.7	2,849.8	204.6	192.7	125.6	153.9	122.0	253.8	334.4	1,135.4	327.4
Sept	6,228.2	3,303.5	2,924.8	210.4	193.3	131.2	156.3	130.4	256.6	339.3	1,200.8	306.5
Dec	6,405.7	3,387.2	3,018.5	222.8	194.9	135.0	158.9	139.7	280.9	355.6	1,246.8	283.9

2003 - Mar	6,460.8	3,390.8	3,069.9	153.1	196.9	139.0	162.1	139.5	296.5	350.7	1,286.3	345.8
June	6,670.1	3,505.4	3,164.7	145.4	199.1	138.2	161.3	138.7	302.8	348.7	1,382.8	347.6
Sept	6,783.2	3,515.3	3,268.0	146.9	201.5	139.9	155.1	137.4	287.8	357.9	1,454.2	387.2
Dec	6,998.0	3,620.1	3,377.9	154.0	203.8	141.2	147.9	136.5	281.5	363.9	1,533.0	416.0
2004 - Mar	7,131.1	3,628.3	3,502.8	162.7	204.5	143.3	142.5	141.0	281.6	373.7	1,677.1	376.4
June	7,274.3	3,742.8	3,531.5	159.9	204.6	146.4	133.6	144.1	259.4	379.7	1,777.5	326.2
Sept	7,379.1	3,772.0	3,607.0	139.9	204.2	150.8	130.5	147.4	255.7	379.4	1,836.6	362.5
Dec	7,596.1	3,929.0	3,667.1	127.5	204.4	151.5	130.4	149.7	254.9	386.4	1,890.7	371.7
2005 - Mar	7,776.9	3,921.6	3,855.4	142.1	204.2	153.8	130.2	153.3	262.3	407.5	1,983.5	418.5
June	7,836.5	4,033.5	3,803.0	127.2	204.2	157.6	130.3	154.6	249.5	434.3	2,017.2	328.1
Sept	7,932.7	4,067.8	3,864.9	125.7	203.6	161.0	131.0	157.7	248.0	456.4	2,070.0	311.5
Dec	8,170.4	4,199.8	3,970.6	n.a.	205.6	n.a	n.a.	n.a.	n.a.	n.a.	2,180.0	n.a.

¹ Source: "Monthly Statement of the Public Debt of the United States (MSPD)." Face value.

² Sources: Federal Reserve Bulletin, table 1.18, Federal Reserve banks, statement of condition, for System Open Market Accounts; and the U.S. Treasury MSPD for intragovernmental holdings. Federal Reserve holdings exclude Treasury securities held under repurchase agreements.

³ Source: Federal Reserve Board of Governors, Flow of Funds Table L.209.

⁴ Includes commercial banks, savings institutions, and credit unions.

⁵ Source: "Monthly Statement of the Public Debt of the United States." Current accrual value.

⁶ Includes U.S. Treasury securities held by the Federal Employees Retirement System Thrift Savings Plan "G Fund."

⁷ Includes money market mutual funds, mutual funds, and closed-end investment companies.

⁸ Source: Federal Reserve Board Treasury International Capital Survey. Includes nonmarketable foreign series, Treasury securities, and Treasury deposit funds. Excludes Treasury securities held under repurchase agreements in custody accounts at the Federal Reserve Bank of New York. Estimates reflect the 1989 benchmark to 1994, the 1994 benchmark to September 2001, the March 2000 benchmark to September 2002, the June 2002 benchmark to December 2003, the June 2003 benchmark to March 2004, and the June 2004 benchmark to March 2005.

⁹ Includes individuals, Government-sponsored enterprises, brokers and dealers, bank personal trusts and estates, corporate and noncorporate businesses, and other investors.

Source: Office of Debt Management, Office of the Undersecretary for Domestic Finance

recent years. Both Japan's yearly deficits and its overall debt level were extraordinarily high in the late 1990s and early 2000s, yet its interest rates were extraordinarily low—the lowest in the industrialized world. More important influences were the Bank of Japan's zero interest-rate policy (ZIRP) and the persistence of deflation in Japan. These two influences—the benchmark rate and the inflation rate—have been much more dominant influences on government bond rates than debts and deficits. In the United States a shift from surpluses to deficits in the early 2000s was accompanied by a decline in market interest rates.

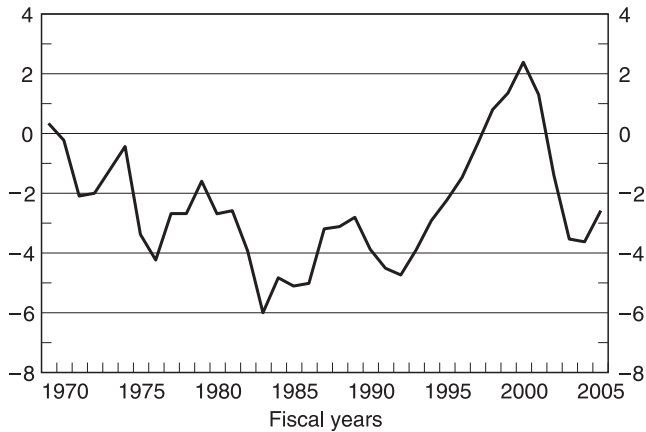
This is not to say that the supply of Treasuries has no bearing at all; just that its impact has been less than many would have predicted years ago. During the 25-year decline in interest rates that began in the early 1980s, supply has in fact mattered, but usually only for short periods—around the time of the Treasury's quarterly refundings, for example. During such times, yields often tended to rise a bit, providing a concession to investors, but the concession varied and was often unnecessary depending upon where investor sentiment stood at the time of the auctions. In sum, based on the relative ease with which the bond market has absorbed literally trillions of dollars of new Treasury supply over the years, and in light of the apparent lack of influence that Japan's large issuance of government bonds has had on its bond market, supply seems a small factor when compared to other variables such as inflation and central bank policy. That said, supply seems to matter most when bearish sentiment is high in the bond market.

In these respects, Figures 8.7 and 8.8 are revealing. The first shows that, despite the huge growth in the absolute size of the Treasury's budget deficit, this deficit equaled, at the end of 2005, only 2.6% of *gross domestic product (GDP)*. This is not high when compared to other major industrialized nations such as Japan, which had a deficit as high as 10% of its gross domestic product during its prolonged recession of the 1990s and early 2000s, and Germany, whose deficit was 3.9% of GDP in 2005. In fact, the combined deficits for the euro area as a whole exceeded the U.S. deficit in 2005, at 2.8%. The point is that when investors put the U.S. budget deficit in the context of the deficits of other major industrialized countries, the U.S. budget data look normal and are no barrier to investing in U.S. Treasuries.

One steady but relatively small source of money to the Treasury comes from state and local governments. The Treasury devised SLUGS, a special series in which state and local government bodies may invest. The origin of SLUGS was that changes in the tax code tightened interest-arbitrage

FIGURE 8.7

Federal budget surplus (+)/deficit (–) as a percent of nominal GDP

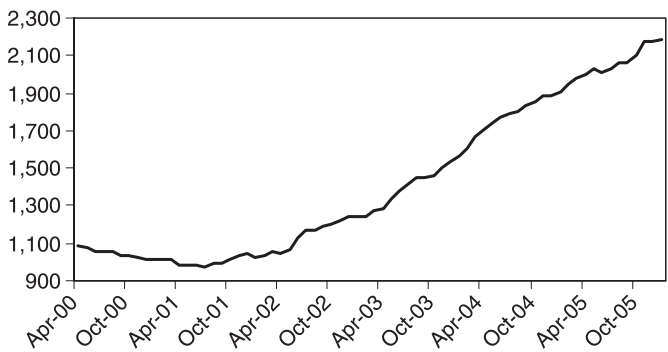


Source: U.S. Treasury Department

penalties on muni bodies that borrowed money at low muni rates that they then invested at higher Treasury rates. Under the SLUGS program, the Treasury calculates the maximum rate that it will pay a muni investor; for its part, the muni investor specifies to the Treasury the rate it is willing to accept. If the latter rate is lower or equals the former, the Treasury sells

FIGURE 8.8

Foreign holdings of U.S. Treasuries (in billions of dollars)



Source: Federal Reserve

the muni body securities. Under the SLUGS program, the Treasury had taken in about \$234 billion of funds from various state and municipal entities as of the end of February 2006. This amount accounts for about half the total holdings by state and municipal entities, which also buy marketable governments.

Another augmentation of the Treasury's regular issuance calendar is its issuance of *savings bonds*. While not much new money has flowed into savings bonds in recent years—at the end of 2005 the total amount of savings bonds outstanding was \$205.1 billion, up just \$4.8 billion from four years earlier—savings bonds have been a familiar investment in America for decades, most prominently during World War II. Indeed, between May 1, 1941, when President Franklin D. Roosevelt bought the first of the so-called War Bonds (aka Victory Bonds), and when the final proceeds from the sale were deposited into the U.S. Treasury on January 3, 1946, \$185.7 billion of war bonds had been sold, and over 85 million Americans had invested in them, a staggering number of people considering that the population was just 130 million at that time. In contrast, today less than 20% of the population owns U.S. savings bonds. It is fair to say that bonds never played a more vital role than they did during World War II. Bonds had never shined more.

Despite the fact that the Treasury has experienced no visible difficulty in selling its debt, people keep putting forth to Treasury officials their pet ideas on how the Treasury should borrow. Treasury debt managers, who seek to fund the government debt as cheaply and with the smallest amount of disruption as possible, see no need for what they view as gimmicks. One official once said, “The U.S. Treasury is issuing the finest paper in the world in terms of liquidity and credit quality. Every theory I know indicates that the Treasury sells its debt to the investor at the lowest expected return and therefore *a priori* at the lowest expected cost to the issuer of any security issued in the world. Why should we clutter up this great market by throwing in gimmicks that no one will know how to price—by creating securities that will have limited marketability, at least at first, and for which buyers will therefore demand a higher return?”

FEDERALLY SPONSORED AGENCIES ISSUING SECURITIES

In Chapter 2, we talk about financial intermediaries, which are institutions that act as conduits through which funds are channeled from

consumers, firms, and other spending units with funds surpluses to spending units (consumers, firms, and government bodies) running funds deficits. Most financial intermediaries in the United States are private (albeit government-regulated) institutions: commercial banks, savings and loan associations, credit unions, life insurance companies, and private pension funds, to name a few.

In addition to these private institutions, a large number of government credit agencies also act as financial intermediaries. These agencies borrow funds which they lend to specific classes of borrowers. The reason for all this government competition to private intermediation is that Congress has periodically taken the position that for some groups of borrowers, the available supply of credit was too limited, too variable, or too expensive. In each instance, Congress's remedy was to set up a federal agency charged with providing a dependable supply of credit at the lowest cost possible to these disadvantaged borrowers. Some federal agencies are owned and directed by the federal government, and their debt obligations are backed by the full faith and credit of the U.S. government. Others are federally sponsored but privately owned. The obligations of federally sponsored agencies presumably have *de facto* backing from the federal government.

The largest government credit agencies specialize in providing mortgage money for housing and agriculture, two favored children of policy makers. In addition, there are agencies that provide credit to small business firms, students, communities financing development projects, and so forth. Of all the agencies, the housing-related agencies are by far the largest suppliers of credit.

Most federal agencies are supposed to set their lending rates so that they at least cover their borrowing costs and perhaps even earn a modest profit. Since each agency's function is to supply funds to borrowers at minimum cost, the rational approach would have been to have the agencies borrow from the cheapest possible source. Because its securities carry zero risk of default and are so liquid, the Treasury can always borrow at lower rates than any other issuer, municipalities excepted (because of the federal tax exemption). Thus, having the Treasury lend to the agencies funds that it had borrowed in the open market would have been the lowest-cost way to fund agency lending.

This approach, however, was not taken. Instead, until 1974 almost all agencies issued their own securities, each carrying some degree of backing from the federal government. The main reason for taking this approach was that if the agencies had all borrowed from the Treasury, the Treasury's

outstanding debt would have gone up commensurately. Today, it would be \$2.6 trillion greater than the \$8.27 trillion figure quoted earlier in this chapter.

Such an increase in Treasury debt could have created problems for several reasons. First, Congress legislates a limit on Treasury borrowing. This limit has no perceptible impact on government spending because Congress always pauses—between passing spending bills—to raise it. Nevertheless, Congress has often been stubborn and slow about raising the debt limit, with the result that in practice it might have been difficult for the Treasury to borrow sufficient funds to meet *all* the agencies' needs. Also, there are voters who lose sleep over the size of the national debt. In this respect, it's important to note that agency and federal debts differ sharply with respect to both source and character. Most Treasury debt is the result of government deficits, a true national debt. In contrast, agency debt is incurred to lend, largely to creditworthy borrowers.

THE FEDERAL FINANCING BANK

As federal agencies proliferated, their borrowings from the public caused several problems. One had to do with calendar scheduling. Each year, federal agencies issue substantial quantities of new debt. Agency issues compete with one another and with Treasury issues for investors' funds, and an uneven flow of agency and Treasury issues to the market could result in rates being driven up one week and down the next. To avoid this, the Treasury schedules the timing and size of both its issues to ensure a reasonably smooth flow of federal issues to the market. In 1973, minor federal agencies made 75 separate offerings, so many that Treasury calendar scheduling of new issues was difficult. Another problem resulting from the proliferation of federal agencies was that the new small agencies constantly being created by Congress were not well known to investors; and because of their small size, their issues were less liquid than Treasury issues. Consequently, small agencies had to pay relatively high borrowing rates.

To deal with these problems, Congress set up in 1973 the *Federal Financing Bank (FFB)*, a government institution supervised by the secretary of the Treasury. The FFB would buy up the debt issues of the smaller agencies, and its clientele included about 20 separate agencies.

The FFB was supposed to obtain funds by issuing securities fully backed by the government in a fashion similar to the way the Treasury

issues its securities. It tried this approach once with an offering of short-term bills. This issue was bid for by dealers and others at yields close to those prevailing on T-bills, but it fell in price in the secondary market, which was discouraging to both dealers and the Treasury. Some dealers felt that if the FFB had continued to issue its securities, they would eventually have been accepted by investors as equal to Treasury issues and would have sold at yields no higher than those on Treasury issues. The Treasury, however, doubted this; one reason was that FFB offerings would have been smaller than Treasury offerings and consequently less liquid. In any case, the FFB discontinued its public offerings and now borrows from the Treasury. Today, only the major federal agencies issue new securities to the market. At the end of February 2006, the FFB had \$14 billion of debt outstanding, although none of the debt was held by the public—it was held in intragovernmental accounts.

AGENCY SECURITIES

As is shown in greater detail in Chapter 14, among the agencies still issuing securities to the public, practices and types of securities issued vary considerably. One can, however, make a few generalizations. Most federal agencies have a fiscal agent through which they offer their securities, all of which are negotiable. Agency issues are not sold directly to investors by these fiscal agents. Instead they are sold through a syndicate of dealers, who distribute the agency's securities to investors and participate in making a secondary market for these securities.

Agency securities comprise short-term notes sold at a discount and interest-bearing notes and bonds. Any bond is an interest-bearing certificate of debt. A *mortgage bond* is a bond secured by a lien on some specific piece of property. Agency bonds are typically not callable.

Like Treasury securities, agency securities are issued under the authority of an act of Congress. Therefore, unlike private offerings, they are exempt from registration with the SEC. Typically, agency issues are backed by collateral in the form of cash, U.S. government securities, and the debt obligations that the issuing agency has acquired through its lending activities. A few agency issues are backed by the full faith and credit of the United States. Others are guaranteed by the Treasury or supported by the issuing agency's right to borrow funds from the Treasury up to some specified amount. Finally, there are agency securities with no direct or indirect federal backing.

TALE OF A FAILED AGENCY: FSLIC AND THE NATION'S S&L CRISIS

In the 1970s, the savings and loan (S&L) industry was a sleepy province of finance. An S&L was supposed to take deposits from consumers at regulated rates, make fixed-rate mortgage loans to home buyers, and earn a modest spread doing so. This worked fine until inflation and interest rates got out of hand, and money funds, paying high rates, began to drain consumer deposits out of banks and S&Ls. Finally, in 1980 the government lifted rate regulation and permitted banks and thrifts to pay market rates on deposits. However, whereas a bank could capture rising interest quickly on the asset side of its balance sheet, an S&L, saddled with old, fixed-rate mortgages, couldn't; consequently, many S&Ls lost yet more money.

In 1981, the Federal Home Loan Bank Board (FHLBB) allowed most thrifts to offer variable-rate mortgages so that their revenues would fluctuate in step with their cost of funds. In 1982, when 75% of the S&L industry was unprofitable, Congress allowed thrifts to branch out into nontraditional activities such as business loans, consumer loans, and real estate.

As the "S&L problem" came to public attention, the Federal Savings and Loan Insurance Corporation's (FSLIC) insurance of S&L deposits, up to \$100,000 per deposit, became a big contributor to the problem. To a depositor, putting money in an S&L appeared—so long as she didn't breach the \$100,000 mark—as safe as buying Treasuries: both investments had full government backing. Consequently, S&Ls around the country, including the shaky and the sick, found that if they posted sexy rates, they were flooded with money from wire houses that brokered their CDs and from responses to their advertisements. Depositors cared naught about the financial condition of the institution to which they were giving their money; they just wanted the top rate available on an FSLIC-insured deposit.

With high-cost money rolling in, S&Ls ventured into ever-riskier, higher-yielding investments. It wasn't uncommon for a once-sleepy S&L with a balance sheet whose footings were \$5 million or \$10 million to explode suddenly into a billion-dollar-plus institution that was financing a collection of speculative investments: huge GNMA portfolios repoed to the hilt (a bet on future interest rates), franchises, no-money-down real estate loans, junk bonds, and so on.

A number of entrepreneurial souls, not all Simon pure, saw the S&L game for precisely what it was: a chance to gamble with other people's

money on attractive terms—heads I win, tails FSLIC loses. With odds like that it made no sense to bet \$100 million if one could bet a billion. Also, if traditional managers lacked sufficient imagination to see the possibilities, developers and other high-flyers who invaded the industry did, especially those who bought and bloated the balance sheets of little S&Ls in Florida, Texas, and California, where real estate speculation was rampant.

All this led to the peculiar phenomenon of a money-losing industry expanding by leaps and bounds, whereas economic law would have dictated that it contract. Using their considerable political clout, thrifts fought to preserve an illusion of solvency. They obtained from Congress and regulators the right to use accounting gimmicks and relaxed bookkeeping standards to hide losses and capital inadequacy. Many thrifts owed their solvency to special certificates, issued by regulators, which were counted as capital.

As early as 1985, it was evident that FSLIC, which dutifully tried to bail out obviously failed S&Ls, was bankrupt. In 1986, an audit by the Government Accounting Office (GAO) made that official. The specter of things to come was clear. If FSLIC couldn't reorganize S&Ls operating at a loss, those institutions would continue to grow, their losses continue to mount.

In 1985, the GAO estimated that cleaning up the S&L industry would cost \$16 billion to \$22 billion. Congress balked at acting for two reasons. It wanted to try every gimmick possible rather than to spend taxpayer dollars. Equally or more important, House Speaker Wright and other members of Congress saw it as their job—thanks to powerful S&L lobbying—to keep the regulators off the backs of S&Ls in their districts. In particular, Texans in government, a numerous and well-placed lot, wanted the regulators to give troubled S&Ls (those in Texas were among the worst) “time to solve their problems.” Giving FSLIC additional funds would enable it to require more sick S&Ls to write off real estate loans in default and other sour investments, so many legislators fought successfully to see to it that FSLIC was grossly underfunded.

In the mid-1980s, the Bank Board saw disaster looming, but its efforts to clamp down on S&L abuses were frustrated by the Reagan administration, Congress, and the thrift industry. For its part, the administration, hell-bent on deregulation, denied the Bank Board money to boost its examination staff.

FICO

Finally, in 1986, FSLIC ran out of money. In response, in 1987 Congress passed legislation that enabled the FHLBB to set up the *Financing Corporation (FICO)*. The sole purpose of FICO was to recapitalize FSLIC by making debt offerings and transferring to FSLIC the funds thus obtained. FICO was authorized to borrow \$10.8 billion. It eventually borrowed \$8.17 billion, all of which was still outstanding in the middle of 2006. Its debt is not government-guaranteed, the 12-district Federal Home Loans Banks pooled funds from retained earnings to buy Treasury zeros that match in maturity and face the \$8.17 billion of bonds FICO eventually issued. FICO was far too little far too late in light of the large losses that the S&Ls would eventually incur.

REFCorp

In 1989, the S&L problem was dumped into the lap of the Bush administration, which decided that the time had come to pay taxpayer dollars to clean up the industry. Those dollars, Bush vowed, wouldn't be spent for nothing; a costly S&L debacle would "never again" occur. Supposedly, under the Bush plan, sick S&Ls would be wiped out before they could accumulate more deficits. However, as that plan worked its way through Congress, it appeared increasingly inadequate.

The Bush plan enacted by Congress assumed that T-bill rates would fall to 4.4%, that the economy wouldn't have a recession for the next 10 years, and that S&L deposits would *grow* (to bring in more premium income to FSLIC) by 7% a year, whereas S&L deposits were in fact shrinking. Also, by requiring S&Ls to pay higher premiums and to hold more capital, the plan threatened healthy S&Ls with higher costs and constraints on growth. The plan's perhaps most costly shortcoming was that it provided only \$35 billion through October 1990 to bail out failed S&Ls. That sounded like a lot, but it was less than the government spent on S&L bailouts in 1987. Also, the new money wouldn't go as far as old money did because, under the new get-tough approach, regulators, in merging sick S&Ls, couldn't continue to use liberal accounting rules, capital certificates, and other gimmicks that formerly permitted them to pare cash outlays.

In any case, the Bush plan called for creation of a new off-budget agency, the *Resolution Funding Corporation (REFCorp)*. Over three years, REFCorp would raise \$50 billion by selling 30-year bonds backed by

deeply discounted, zero-coupon, nonmarketable Treasuries purchased with thrift industry money. The funds raised would go into the Resolution Trust Corporation (RTC), which would take over and liquidate assets, valued at \$400 billion, of failed thrifts. In doing so, REFCorp was to get powers to issue IOUs and loan guarantees—powers that enabled FSLIC in 1988 to issue \$40 billion of notes without congressional permission. Industry observers, ranging from the ultraconservative to ultraliberal, for once agreed on something: REFCorp would rack up many billions of dollars before the S&L mess would be cleaned up.

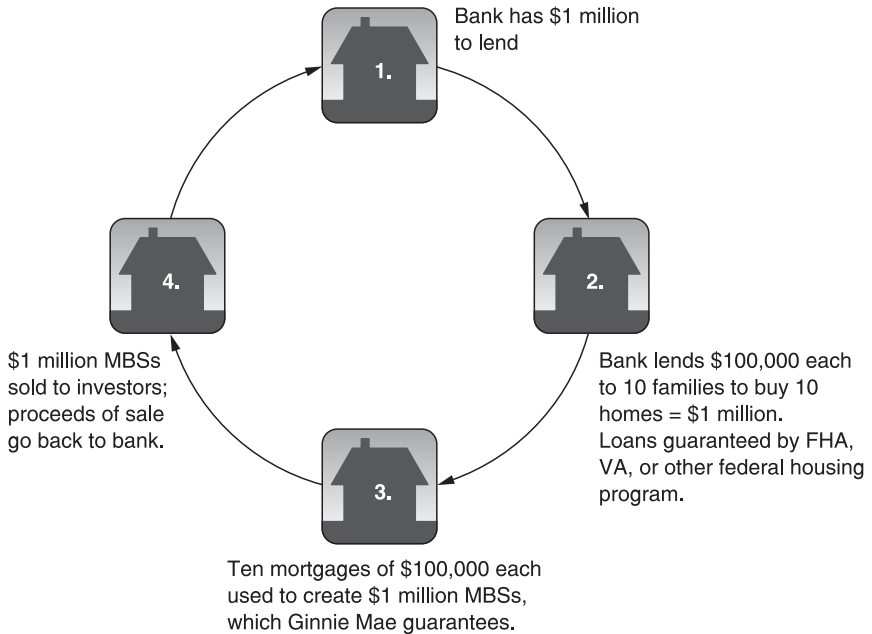
Government National Mortgage Association

The 1968 partition of the old Federal National Mortgage Association spawned yet another financial lady, “Ginnie Mae,” more formally known as the *Government National Mortgage Association (GNMA)*. Ginnie Mae, a wholly government-owned corporation within the Department of Housing and Urban Development, took over the special assistance and the management and liquidating functions that had formerly been lodged in FNMA.

These functions involve activities that could not be profitably carried out by a private firm. Ginnie Mae’s mission is also to make real estate investment more attractive to institutional investors, which it has done by designing and issuing—partly in conjunction with private financial institutions—mortgage-backed securities, pass-throughs, for which there is a very active secondary market. Ginnie Mae does not buy or sell loans or issue mortgage-backed securities and instead guarantees the cash flows on mortgage-backed securities (MBSs)—securities that it pioneered in 1970, backed by federally insured or guaranteed loans, mostly those insured by the Federal Housing Administration and the Department of Veterans Affairs (Figure 8.9). About 69% of Ginnie Mae MBSs were created by approved mortgage bankers by the end of 2005; commercial banks were second at about 10%, followed by savings and loan associations at about 10%.

By 2006, Ginnie Mae had guaranteed more than \$2.3 trillion in mortgage-backed securities, providing mortgage financing for more than 31 million people. It has done so with a small staff; it employed 66 government employees at the end of 2004, as most work is outsourced to contractors who consume the vast majority of Ginnie Mae’s operating expenses.

Under its special assistance function, Ginnie Mae provides financing for selected types of mortgages through mortgage purchases and

FIGURE 8.9**The Ginnie Mae process**

Source: Ginnie Mae

commitments to purchase mortgages. Ginnie Mae finances its special assistance operations partly with funds obtained from the Treasury.

Under the pass-through approach, private mortgage lenders assemble pools of mortgages acquired through Ginnie Mae auctions or from other sources and then sell certificates backed by these mortgages to investors. These certificates are referred to as *pass-through securities* because payment of interest and principal on mortgages in the pool is passed on to the certificate holders after deduction of fees for servicing and guarantees. Pass-through certificates have stated maturities equal to those of the underlying mortgages. However, actual maturities tend to be much shorter because of prepayments. For example, during the refinancing boom of the early 2000s, some folks refinanced their mortgages more than once, and this reduced the average maturity on mortgage loans to much less than seven years for a time. On pass-through securities, principal and interest are paid *monthly* to the investor. Pass-through certificates carry Ginnie

Mae's guarantee of timely payment of both principal and interest and are backed in addition by the full faith and credit of the U.S. government.

Ginnie Mae also runs a real estate mortgage investment conduits (REMICs) program. REMICs direct principal and interest payments from underlying mortgage-backed securities to classes of securities with different principal balances, interest rates, average lives, prepayment characteristics, and final maturities. According to Ginnie Mae, unlike traditional pass-throughs, the principal and interest payments in REMICs are not passed through to investors pro rata; instead they are divided into varied payment streams to create classes with different expected maturities, differing levels of seniority or subordination or other characteristics. The assets underlying REMIC securities can be either other MBSs or whole mortgage loans. Ultimately, REMICs allow issuers to create securities with short-, intermediate-, and long-term maturities, which could help issuers to expand the MBS market by catering to the needs of a wider variety of investors.

FARM CREDIT AGENCIES

The production and sale of agricultural commodities require large amounts of credit. So too does the acquisition by farmers of additional land and buildings. To ensure an adequate supply of credit to meet these needs, the government created over time the Farm Credit Administration. This administration, which operates as an independent agency of the U.S. government, oversees the Farm Credit System (FCS), a privately owned, federally chartered organization composed of close to 100 financial institutions that operate in all states plus Puerto Rico. There are four regional Farm Credit Banks in the Farm Credit System and one Bank for Cooperatives. Typical services offered by the regional banks and associations include real estate loans, operating loans, rural home mortgage loans, credit-related life insurance, crop insurance, and various financially related services such as farm record-keeping and financial planning. The cooperative, Agricultural Credit Bank, provides loans to farmers and their cooperatives.

The Funding Corporation is the fiscal agent for the system banks. The Funding Corporation utilizes selling groups of investment banks and dealers to issue farm credit debt securities. The system banks do not take deposits; funds for loans are obtained through the issuance of farm credit debt securities. At the end of February 2006, the FCS had \$115.5 billion of debt outstanding.

FEDERAL AGENCY SECURITIES

Federal agency securities have been around in significant volume for a few decades, and during that time their amount outstanding has grown rapidly (Figure 8.10). At the end of 2005, marketable agency securities totaled approximately \$2.6 trillion, about 20% more than five years earlier.

Attraction to Investors

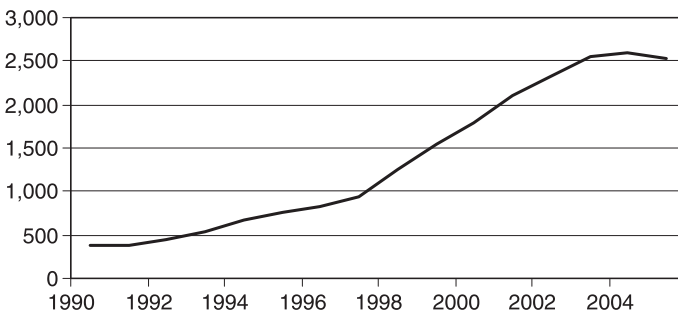
Federal agency securities are attractive for several reasons. Most agency issues are backed either de jure or de facto by the federal government, so the credit risk attached to them is zero or negligible. Also, some agency issues such as debt issued by the Federal Home Loan Banks, Farm Credit Banks, and Sallie Mae offer the tax advantage that interest income on them, like interest income on governments, is exempt from state and local taxation.

A third advantage of many agency issues is liquidity. Agency issues are smaller than Treasury issues so they do not have the same liquidity Treasury issues do, but their liquidity compares favorably with that of many other money market instruments, as evidenced by the daily trading volume in agencies, which was \$80 billion in 2005.

Normally, agencies trade at some spread to Treasuries of the same maturity. This spread varies considerably depending on supply conditions and the tightness of money. The difference between the rates at which agencies and governments trade apparently reflects almost solely the differences in the liquidity of the two sorts of instruments since capital-rich

FIGURE 8.10

GSE credit instruments outstanding (in billions of dollars)



Source: Federal Reserve

institutions like the Federal Home Loan Banks must, to borrow, pay roughly the same rates that more poorly capitalized federal agencies pay.

Controlling Federal Agency Debt

There are two sorts of federal agencies that get involved in the credit market: those such as the student loan program, which provide government guarantees of loans, and sponsored agencies such as Fannie Mae, which, although they have been largely “privatized,” are regarded by most people who lend them money as the government in disguise. The Treasury has approval rights but no explicit control over the issuance of debt by sponsored agencies. The Reagan administration wanted to make such agencies as close to private as possible. In its view, having sponsored agencies lend, for example, to the housing market makes it appear as if the private sector is doing the job whereas in fact the government really is.

To make the sponsored agencies truly private, the government would have to cut them off from all government ties: no more government borrowing lines, no more government oversight, no more government assistance, implicit or explicit. The government is unlikely to make such dramatic changes because it would meet determined opposition from both the agencies and the sectors they serve. The agencies want oversight and regulations that help to ensure the safety and soundness of their organizations, and the sectors they serve think the current system lowers their borrowing costs. Probably the biggest hurdle is the feeling that if the housing-related agencies were truly private, home ownership could eventually be jeopardized. Congress recognizes that home ownership is considered the American dream. No one wants to get in its way.

REVIEW IN BRIEF

- The single most important issuer of debt in the money market is the U.S. Treasury, which had \$4.5 trillion of publicly traded debt outstanding at the end of 2005.
- The Treasury was holding about \$4 trillion of nonmarketable debt outstanding at the end of 2005, consisting mostly of debts owed to the Old-Age and Survivors Disability Insurance Trust Fund.
- The Treasury issues four main types of *marketable securities*: bills, notes, bonds, and inflation-indexed securities.

- The first secretary of the Treasury, Alexander Hamilton, established principles in his *First Report on the Public Credit* that continue to guide the Treasury Department today.
- The Treasury has utilized many approaches to issuing securities over the years, including subscriptions and exchange offerings, for example, but it now utilizes yield auctions.
- The *regularization* of Treasury issuance has been an important factor in the development of a deep and liquid secondary market for Treasuries. *Transparency* in the issuance calendar has also been important, although the unpredictability of the Treasury's cash flows makes complete certainty about the calendar somewhat elusive.
- Aside from their role as an investment, there are a variety of *economic uses* for Treasuries, including pension accounting, hedging and speculating, regulatory purposes, and as a benchmark for loan rates.
- The bond market has been able to absorb massive amounts of new Treasury supply without any apparent deleterious impact on the interest-rate environment. A similar situation has occurred in Japan where debts have been higher but interest lower than in the United States. This illustrates the importance that other factors such as inflation and monetary policy have on the interest-rate picture.
- Some *federal agencies* are owned and directed by the federal government, and their debt obligations are backed by the full faith and credit of the U.S. government. Others are federally sponsored but privately owned.
- The largest government credit agencies specialize in providing mortgage money for housing and agriculture, two favored children of policy makers.
- As is shown in greater detail in Chapter 14, among the agencies still issuing securities to the public, practices and the types of securities issued vary considerably.
- At the end of 2005, marketable agency securities totaled approximately \$2.6 trillion, about 20% more than five years earlier.

Don't Fight the Fed!

The Powerful Role of the Federal Reserve

Don't fight the Fed! There is perhaps no better advice that someone can give to an investor than to heed these words. Time and time again, investors have learned that it is fruitless to ignore the powerful influence of the Federal Reserve. Yet many investors put little effort into trying to gain a better understanding of this powerful institution. They see the Fed as too complex, secretive, and mysterious to be readily understood. Equity investors seem to be especially intimidated, often choosing to let the bond market tell them what to expect next rather than do the thinking for themselves. But the Fed's impact on the performance of nearly all financial assets and the money market in particular is so unmistakable that it behooves every investor to learn more. It's an endeavor that can have great rewards.

THE FED'S RAISON D'ETRE: FINANCIAL STABILITY ACROSS THE LAND

Ever since President Woodrow Wilson signed the Federal Reserve Act of 1913 at 6:02 p.m. on December 23 of that year, the Federal Reserve has been evolving into one of the most powerful institutions in the United States.

The author would like to thank Louis Crandall for his extensive collaboration in the revision of this chapter in the third edition. Mr. Crandall, a professional Fed watcher and resident economist for R. H. Wrightson & Associates, Inc., wrote, in particular, the sections covering the monetarist experiment and developments in Fed policy making during the 1980s.

The act established the Fed with the goal of providing stability to the U.S. financial system, which at that time had no official backstop in the event of financial crises. The act stated that the Fed would “provide for the establishment of Federal reserve banks, to furnish an elastic currency, to afford means of rediscounting commercial paper, to establish a more effective supervision of banking in the United States, and for other purposes.” Other purposes, indeed. Ever since that important day in our nation’s financial history, the Fed’s role has expanded greatly to the point that its influence now stretches across the globe.

Over time, new legislation has molded the Fed’s role into the institution we know today. There were two particular additional acts of Congress that refined and supplemented the objectives of the Fed, as originally stated in the Federal Reserve Act of 1913. The acts were the Employment Act of 1946 and the Full Employment and Balanced Growth Act of 1978 (sometimes referred to as the Humphrey-Hawkins Act after its original sponsors). These two acts restated the Fed’s objectives to include economic growth in line with the economy’s growth potential, a high level of employment, stable prices (in terms of the purchasing power of the dollar), and moderate long-term interest rates.

From the Fed’s vantage point, its duties are now seen falling into four general areas:

- Conducting the nation’s monetary policies by influencing the money and credit conditions in the economy in pursuit of full employment and stable prices.
- Supervising and regulating banking institutions to ensure the safety and soundness of the nation’s banking and financial system and to protect the credit rights of consumers.
- Maintaining the stability of the financial system and containing systemic risk that may arise in financial markets.
- Providing certain financial services to the U.S. government, to the public, to financial institutions, and to foreign official institutions including playing a major role in operating the nation’s payment systems.

Of the four, the first is the most prominent and is the one that by far gets the most attention in the financial markets. It also is a key focal point of this chapter.

The Federal Reserve Act of 1913 divided the country into 12 districts and provided for the creation within each of a *district Federal Reserve Bank*.

Responsibility for coordinating the activities of the district banks lies with the Federal Reserve's *Board of Governors* in Washington, D.C. The board has seven members appointed by the president and confirmed by the Senate.

The main tools available to the Fed for implementing policy are open market operations, reserve requirements, and the discount rate. On paper, authority for policy making at the Fed is widely diffused throughout the system. In practice, however, this authority has gradually been centered in the *Federal Open Market Committee (FOMC)*, which was established to oversee the Fed's open market operations. Members of the FOMC include all seven governors of the system, the president of the New York Fed, and the presidents of four of the other eleven district banks, who serve on a rotating basis. Every member of the FOMC has one vote, but it has become tradition that the chairman of the Board of Governors plays a decisive role in formulating policy and acts as chief spokesperson for the system, which is why this position is viewed as one of high power and importance.

In establishing policy, the Fed enjoys considerable independence on paper from both Congress and the executive branch. Members of the Board of Governors are appointed to 14-year terms so that a president has only limited control over who serves on the Board during his term of office. The chairman of the Board, who is designated as such by the president, serves in that capacity for only four years, but his term is not coincident with that of the president, so an incoming president may have to wait until well into his first term to appoint a new chairman.

Congress, like the president, has no lever by which it can directly influence Fed policy or the way it is implemented. In creating the Fed, Congress endowed this institution with wide powers and granted it considerable leeway in exercising discretion and judgment.

The perception that the Fed's independence is limited once influenced Fed policy, but it has been over two decades since there has been any meaningful degree of such influence. In particular, during the late 1970s and early 1980s when the Fed was tightening and it appeared that interest rates might reach unacceptable levels, the Fed attempted to force a contraction in bank lending while simultaneously preventing interest rates from rising to market-clearing levels. During one such period, 1977, a banker commented. "It is not always politically feasible for the Fed, when it wants to curtail bank lending, to allow interest rates to go where they must to do so. The Fed would never admit this, but they know they are a creature of Congress, and Congress would never let the prime go

to 15%—one way or another it would remove in one fell swoop the so-called independence of the Fed.” So much for predictions. In the grand monetarist experiment, begun in October 1979, the Fed unhinged interest rates from its control, and the prime soared to over 20%. Congress did not “react in one fell swoop” to limit the independence of the Fed, but by 1982 it was tiring of historically high interest and threatening to mandate a change in the focus of Fed policy from controlling money supply back to pegging interest rates. Such politicizing of the prime was not unique to the United States; it has occurred in Britain and elsewhere as well.

POLITICAL PRESSURES ON THE FED ARE MORE FICTION THAN FACT

Political pressure on the Fed has been more fiction than fact over the past two decades. The last time there was even a modicum of suspicion over any political influence was in the early 1990s during the administration of the first President Bush. During Bush’s presidency, the Federal Reserve lowered interest rates many times—over 20 times in fact—in response to an ebbing of inflation pressures and a slowing of the U.S. economy that would eventually lead to the recession of 1990–1991. Despite the Fed’s efforts, Bush and members of his administration repeatedly voiced their discontent with the pace of the Fed’s rate cuts, which usually came in 25 basis point increments. Ostensibly, the Bush administration was concerned that the long lag between interest-rate cuts and their impact on the economy might mean that the economy would not recover in time to help Bush in the 1992 election campaign. Bush wanted the Fed to move faster, as he stated during the 1992 presidential debates: “Alan Greenspan is respected. [But] I’ve had some arguments with him about the speed in which we have lowered interest rates.”

Bush may have had a point. Despite the recession and the slow economic growth that followed, the Fed had lowered rates in baby steps. It took the Fed three and a half years before settling on an interest-rate level it felt would help revive the economy. The Fed eventually found the equilibrium rate that would help to revive growth, but it would not be reached until Bush left office. By taking so long to find the equilibrium interest-rate level that would work, the Fed essentially validated the claim that it had moved too slowly. The episode also offers evidence that the Fed does not bow to political pressure. Greenspan nonetheless must have learned from that experience, judging by the rapid pace of interest-rate cuts that he and the

Fed implemented in 2001, when the Fed lowered interest rates an unprecedented 11 times, most of them a half percentage point.

Neither President Clinton nor the second President Bush has since put even a fraction of the pressure on the Fed that the first President Bush did. The relationship between the Fed and the executive branch has since been quite cordial, and both Presidents Clinton and Bush have gone to great lengths to affirm the independence of the Federal Reserve. Monetary policy has therefore been conducted without the influence of any undue political pressures. That said, members of Congress, particularly members of the House of Representatives, continue to chide the Fed, seeking to play to their home audiences with criticism of the Fed's policies. Luckily, however, the Fed, led by Fed Chairman Alan Greenspan from 1987 to 2006, has shown a great understanding of the dynamic that shapes such behavior and not let Congress have any meaningful influence on monetary policy.

Despite the apparent lack of politicization to monetary policy making, speculation naturally arises around the time of national elections. Recent history shows, however, and Fed members have indicated that the national elections have had no bearing on the decision-making process of the Federal Reserve. Such was the case throughout Greenspan's tenure when the Fed formulated policies that reflected conditions in the economy rather than the election calendar, and even in the early days of Fed Chairman Ben Bernanke's tenure ahead of the midterm election in November 2006.

IMPLEMENTING MONETARY POLICY

The primary policy tool available to the Fed is open market operations, the ability to create bank reserves in any desired quantity by monetizing some portion of the national debt.¹ The Fed could in theory monetize anything—scrap metal to soybeans—but it has stuck largely to Treasury IOUs because there has never been any shortage of them; also, they are highly liquid so the Fed can sell them with as much ease as it buys them. In formulating policy, the first question the Fed faces is what macroeconomic *targets* to pursue. There are various possibilities: full employment, price stability, or a “correct” exchange value for the dollar. The achievement of *all*

¹ See Chapter 2 for an explanation of debt monetization and a primer on how the Fed creates and destroys bank reserves.

these targets is desirable. However, since the Fed has only *one* powerful string to its bow—the ability to control bank reserves and thereby money creation by the private banking system—and given the fact that the Fed now targets interest rates rather than reserve levels, the Fed must conduct its open market operations in a way that strikes the right balance first and foremost via the appropriate target rate. (See Table 9.1.)

Once the Fed has chosen its policy targets, it faces a second difficult question: What policies should it use to achieve these targets? For example, if it wants to pursue a tight money policy to curb inflation, does that mean it should force up interest rates, or what?

Not surprisingly, the Fed's answers to the questions of what targets it should pursue and of how it should do so changes considerably over time. One reason is that external conditions—the structure of financial markets and the state of the domestic and world economies—are in constant flux. A second reason is that central banking is an art form that's not fully understood, and the Fed's behavior at any time is therefore partly a function of how far it has progressed along its learning curve.

Although the Fed's mandate hasn't changed much over the years, the policies the Fed has chosen to use to meet its mandate have. This was demonstrated by the jolt the Fed gave to the capital markets in early 1978 when it tightened, unexpectedly in the face of a sluggish economy, to defend the exchange value of the dollar. It was again demonstrated with far greater vigor when, in October 1979, the Fed switched to monetarism, pure and simple, in a last-ditch effort to wring out of the economy a high and obdurate rate of inflation. By late 1982, the Fed appeared to have taken the pragmatic decision to declare that the inflation battle had been won for the moment and to focus first on stimulating a severely depressed economy, later on sustaining a record-long expansion. In 1988 and 1989, when the consumer price index jumped to over 5.0%, the Fed showed a renewed sensitivity to the danger of inflation as indicated by its tightening in 1988 to 1989. Its gradual interest-rate cuts beginning in early 1989 reflected a shift to a new style of fine-tuning, or gradualism, which Greenspan became widely known for and stayed with until his term ended in January 2006.

Whatever its ultimate macroeconomic goals may be, the Fed currently states its immediate policy objectives in the policy statements that follow its policy meetings. It does so primarily by indicating a target level for the fed funds rate.

TABLE 9.1**The Fed's changing definitions of money supply****Prior to February 1980**

- M1: Currency in circulation plus demand deposits.
- M2: M1 plus small-denomination savings and time deposits at commercial banks.
- M3: M2 plus deposits at nonbank savings institutions.
- M4: M2 plus large-denomination CDs.
- M5: M3 plus large-denomination CDs.

February 1980

- M1A: Currency in circulation plus demand deposits.
- M1B: M1A plus other checkable deposits, including NOW accounts.
- M2: M1B plus overnight repos and money market funds and savings and small (less than \$100,000) time deposits.
- M3: M2 plus large time deposits and term repos.
- L: M3 plus other liquid assets.

January 1982

- M1: Currency in circulation plus demand deposits plus other checkable deposits, including NOW accounts.
- M2: M1 plus savings and small (less than \$100,000) time deposits at all depository institutions plus balances at money funds (excluding institutions-only funds) plus overnight repos at banks plus overnight Euros held by nonbank U.S. depositors in the Caribbean branches of U.S. banks.
- M3: M2 plus large (over \$100,000) time deposits at all depository institutions plus term repos at banks and S&Ls plus balances at institutions-only money funds.
- L: M3 plus other liquid assets such as term Eurodollars held by nonbank U.S. residents, bankers' acceptances, commercial paper, Treasury bills and other liquid governments, and U.S. savings bonds.

December 1982

The Fed included the new money market deposit accounts (MMDAs) that depository institutions were permitted to offer on December 14, 1982, in M2.

May 2006

Fed ceases publication of M3 on March 23, 2006.
See Table 2.4 for current definitions of the money supply.

FOMC Meetings: The Great Debate

By law, the FOMC must meet at least four times each year in Washington, D.C., but since 1980 it has held eight meetings per year five to eight weeks apart. At each meeting, which is closed to the public and generally begins at 9:00 a.m. (ET), staff officers of the Federal Reserve System present oral

reports on the economy, conditions in the financial markets, and international financial developments. Then the manager of the system open market account (SOMA), who is essentially in charge of seeing to it that the Fed's open market operations are carried out in a way that is consistent with the Fed's directive on interest rates, reports on SOMA's transactions since the previous meeting.

Following these reports, both the committee members and the other Reserve Bank presidents each discuss their views on the economy as well as their views on the appropriate course to take on monetary policy. Each voting member then votes on a specific policy recommendation to be carried out during the coming intermeeting period. Once a consensus is reached, the committee issues a directive to the Federal Reserve Bank of New York—the bank that handles transactions for SOMA. The directive provides guidance to the manager of SOMA for the implementation of the committee's decision on interest rates. Although the Fed chairman has only one vote in this process, his power of persuasion goes far beyond that single vote. Federal Reserve Chairman Alan Greenspan, for instance, was well known to seek a consensus around his own personal views on the appropriate policy stance. There's little doubt that the Fed chairman wields immense power at the FOMC, even though existing laws do not mandate that power. Rifts can develop, of course, and it takes a chairman with astute political skills to negotiate them without undermining the credibility of the committee. Greenspan demonstrated such skills on many occasions.

The bond market's anticipation of the FOMC meetings and the announcement of the Fed's policy statement are the subject of intense debate and at the center of a great number of investment strategies. It's easy to understand when you look at the relationship between the federal funds rate and bond yields. The focus on the FOMC meetings can reach the point of obsession, at times, with each piece of economic datum spurring a new round of intense debate and market volatility. Public comments from Fed officials intensify the debate further and are an important part of the way in which investors form their opinions on the likely outcome of FOMC meetings. We talk about this a bit more in-depth later in the chapter.

The Federal Reserve generally announces its decision on interest rates at about 2:15 p.m. (ET) on the day of its FOMC meetings except when the FOMC meetings span two days, which is occurring more frequently under its new chairman Ben Bernanke. (During Greenspan's tenure, two-day meetings only occurred in the two meetings prior to the

Fed chairman’s semiannual monetary policy report to Congress.) In these cases, the announcement is delivered on the second day of the meetings, also at about 2:15 p.m. (ET). The bond market’s reaction to the FOMC’s decision is often sharp, particularly on the short end of the yield curve but is sometimes tempered by how well the markets were prepared for the outcome. Nevertheless, the reverberations from the Fed’s actions can last for many months, especially at the onset of a series of rate moves.

**Day-to-Day Operations of the
Open Market Desk**

As noted, the FOMC gives the account manager in New York several sorts of directives: target ranges for monetary growth, a target range for Fed funds, and so on.² As noted later, evidence accumulated over many years indicates that, at least in mid-2005, the constraint that counted was to keep the Fed funds rate within a narrow target range.

Having picked its primary operating target, the New York Fed’s open market desk, with the aid of staff at the Board in Washington and at the New York Fed, estimates what reserves depository institutions will need to support its principal target. The desk then adds to this figure an estimate of the excess reserves that banks will hold and deducts from it an estimate of what appropriate or currently *targeted* borrowings from the discount window will be. The *net* of these figures is the amount of reserves that the desk seeks to supply on average over the week through its open market operations (Table 9.2).

TABLE 9.2

Calculating the desk’s reserve target

	Reserves needed to support deposits consistent with target
+	Appropriate borrowings at the discount window
–	Estimated excess reserves
=	Reserve target to be supplied by the desk

² People at the Fed distinguish between quarterly *targets* and *tolerance ranges* that are permissible within any month; the latter are wider because the shorter the period, the more difficult it is to tightly control the rate of monetary growth.

The desk's task sounds straightforward, but in practice it's tricky to carry out. First, the numbers on which its reserves target is based are estimates, which may prove incorrect, of what excess reserves and borrowings at the discount window will be. Second, the quantity of reserves actually available on any day to depository institutions is influenced not only by actions taken by the desk but also by unpredictable changes in Treasury balances, float, currency in circulation, and other *operating factors* that together can easily total several billion dollars. The accuracy with which the Fed has been able to estimate the amount of reserves in the financial system improved in 2004, according to the New York Fed's annual report on domestic open market operations filed in January 2005. Table 9.2 provides explanations of factors causing variability in the quantity of reserves in the financial system.

Treasury Balances

Because of tax collections and securities sales, the Treasury holds huge and highly variable deposit balances. These balances were once primarily held in commercial banks in what are called *Treasury tax and loan (TT&L) accounts*. When it did so, the Treasury, as it needed to make disbursements, would transfer funds from its TT&L accounts into its account at the Fed and write checks against that.

Then in 1974, the Treasury adopted a new policy. It began to hold most of its deposits at the Fed. Its primary reason for doing so was to raise its revenues. By depositing huge sums in its account at the Fed (which drained bank reserves, see Table 9.3), the Treasury forced the Fed to expand its portfolio via additional open market purchases, and the result was that the Fed earned more profit. All Fed profits above a small amount are paid to the Treasury. So by holding its balances at the Fed, the Treasury turned them in effect into interest-bearing deposits.

After the Treasury began holding the bulk of its funds at the Fed, movements of funds into and out of its account there became both huge and difficult to predict. The sheer size of the shifts in Treasury balances created operational problems for the Fed, which had a hard time offsetting these flows through normal open market operations. To alleviate this problem, Congress—prodded by the Fed—acted to permit banks beginning in 1978 to pay the Treasury interest on demand balances held with them. For its part, the Treasury started paying banks for services that banks had previously provided free to it in exchange for non-interest-bearing deposits.

TABLE 9.3

When the Treasury transfers funds from an account at a commercial bank to its account at the Fed, this decreases bank reserves

The Treasury		Citibank	
	Demand deposits at Citibank -10MM	Reserve -10MM	Treasury tax and loan account -10MM
	Deposits at the Fed +10MM		
The Fed			
		Reserves, Citibank -10MM	
		U.S. Treasury deposits +10MM	

According to the Federal Reserve Bank of New York, the maximum daily swing in Treasury balances during 2004 was \$4.3 billion, and the daily average was \$739 million, amounts large enough to create major uncertainties with respect to the Fed’s daily open market operations. Helping to alleviate uncertainties is the very large capacity for TT&L accounts, which significantly lower the risk that the Treasury’s Fed balance might exceed its normal \$5 billion target because of insufficient TT&L capacity.

Float

Whenever a check is cleared through the Fed, the Fed first credits the reserve account of the bank at which the check is deposited by the amount of the check and then debits the reserve account of the bank against which the check is drawn by a like amount. Sometimes, the reserve credit is made before the reserve debit, which results in a temporary and artificial increase in reserves. This increase is referred to as *float*. Since the size of float can be affected by such factors as the weather (when planes can’t fly, movement of checks and reserve debiting are slowed), float has been and remains a difficult variable to estimate.

The impact of check float will decline in the years ahead owing to laws recently passed by Congress. Called the *Check 21 law*, it gives digital

images of checks the same legal standing as paper checks. The law, which went into effect in October 2004, enables banks to transmit checks electronically and thus clear them faster. In the future, checks will therefore clear within 24 hours. Given that the daily variation in float was as high as \$5.7 billion in 2004, the elimination of uncertainties with respect to float will be a big help to the Fed when it is conducting its daily open market operations.

Currency in Circulation

Whenever the public needs more currency during a peak spending season, such as Christmas or vacation time, it will withdraw extra currency from the banking system, which gets additional currency by buying it from Federal Reserve Banks. When the Fed ships currency to the banks, it charges their reserve accounts, which in turn reduces bank reserves. Later, seasonal inflows of currency into the banks have the effect of increasing bank reserves. Thus, a third operating factor that affects bank reserves is seasonal variations in the public's demand for currency. In 2004, the amount of currency in circulation fluctuated by as much as \$3.51 billion per day, varying on average by about \$1 billion per day.

Intervention in the Foreign Exchange Market

A fourth factor that in the past has had a tricky-to-unravel impact on bank reserves is foreign exchange intervention by the U.S. and foreign central banks. From the desk's perspective, there is no difference between (1) reserves created (or destroyed) via intervention and (2) reserves created (or destroyed) by a rise (or fall) in float. Both factors are folded into the desk's morning estimate of the imbalance in the reserves market and would routinely be offset by the desk through open market operations. Thus, the distinction that some economists draw between sterilized and unsterilized foreign-exchange intervention is fallacious. Foreign currency intervention has been rare in the United States especially compared to the Bank of Japan, which conducted over 300 intervention operations between 1991 and 2004, most of which were meant to strengthen the U.S. dollar. In contrast, the Fed hasn't intervened in the foreign-exchange market since 1998 when it coordinated with the Bank of Japan to help stop a slide in the Japanese yen.

Adding and Draining

By comparing its estimate of reserves available to depository institutions with its reserve target, the desk determines each day what amount of

TABLE 9.4

The Fed adds to bank reserves by doing a repo with a bank dealer

The Fed		Citibank	
Bills bought under repurchase agreement	Reserves, Citibank +10MM	Reserve +10MM	Securities sold under agreement to repurchase
+10MM			+10MM

reserves it needs to inject or drain from the system. To add reserves, the Fed either buys securities *or* does repos with dealers in government securities. In 2004, the Fed arranged 192 repos. To drain reserves, the Fed either sells securities *or* does reverses with the dealers. In 2004, the Fed arranged just one draining operation. As Table 9.4 shows, when the Fed does a repo with a bank dealer, this adds to bank reserves just as an outright purchase of bills would; a repo done with a nonbank dealer would have the same effect on bank reserves. Reverses done by the Fed are repos in reverse gear—they drain reserves.

The securities the Fed buys vary from day to day depending partly on availability. Bills and notes can usually be easily bought in size, and the Fed holds a large proportion of its portfolio in such securities (Table 9.5). Much of the rest is in bonds; which, owing to changes in Treasury debt management policy, represent a growing portion of the Treasury's outstanding debt.

TABLE 9.5

The Federal Reserve System's open market account holdings, September 13, 2006 (in billions of dollars)

U.S. Treasury bills	277.018
U.S. Treasury notes and bonds	471.791
U.S. Treasury inflation-indexed securities	26.018
Total SOMA holdings	764.827

Source: Federal Reserve Board

The Fed also used to buy federal agency securities, in part because it was directed to do so by Congress in 1971 to help support the market for these securities. However, the agency market matured, and since the early 1980s the Fed has bought no agencies outright. It does, however, still do repos against agencies.

The Fed used to buy bankers' acceptances (BAs) as part of its program to encourage the growth of the domestic BA market (Chapter 21). However, now that the market has matured, the Fed no longer purchases BAs for its own portfolio.

The Fed sometimes buys governments for same-day settlement; more typically, however, it buys for regular or skip-day settlement because, when it buys on those terms, it gets better offerings from the dealers.³ When the Fed wants to reduce reserves by selling securities, it sells securities of short maturity.

In carrying out open market operations, the open market desk constantly has two objectives in mind: (1) the need to offset short-term fluctuations in reserves due to changes in float and other variables and (2) the need to gradually and secularly increase bank reserves so that the money supply and bank credit can expand—within the bands set by the FOMC—in step with economic activity and national output. In making day-to-day short-term adjustments in reserves, the desk relies primarily on repos and reverses, which it does against governments and agencies. Permanent injections of reserves are done through purchases of Treasury bills, notes, bonds, and inflation-indexed securities. They are also known as “passes.” The Fed conducted 40 such operations in 2004, averaging \$1.07 billion each. This compares with 22 operations in 2003, averaging \$1.02 billion.

The line between Fed actions that are a reaction to short-term fluctuations in reserves and those designed to add permanent reserves is difficult to draw because the two often mesh. Also, because of uncertainty with respect to reserve availability, the Fed is often forced to switch gears. Here's a scenario of how things on the desk might go during reserve week: “Our research department does projections of available reserves, and some are done in Washington at the Board. We compare notes on these projections during our morning conference call with the Board. Mostly, we focus on our projections for the current week, but to give perspective to any action we might want to take, we give projections for the next several weeks. Then, we

³ A skip-day trade is settled two business days after the trade is made. A cash trade is settled on the day it is made.

build up a program for the day based on what we think the need is and on the information flowing in from the market.

“Say it is Thursday, and we figure we need \$59.4 billion of reserves on average over the week.⁴ We think excess reserves will run \$1 billion, and the FOMC directive takes \$500 million to be an appropriate level of borrowed reserves. Then we have a reserve target of \$60.4 billion of which \$500 million is expected to come from borrowings. Say our projections tell us that unanticipated changes in Treasury balances, float, and currency in circulation aside, there would be \$58 billion of nonborrowed reserves in the system if we took no action. That would leave us with \$1.9 billion of nonborrowed reserves to add for that week on average.

“We would proceed to add those reserves; and if all went well—the banks did end up with \$600 million of excess reserves and so on—that would result in the level of reserves—borrowed and nonborrowed—being just about consistent with the level the committee wanted.”

One problem the Fed faces in hitting its reserve target is that the distribution of reserves within a settlement period can be highly skewed, with a lot of reserves being available early or late in the period. Because most banks are unwilling to run big reserve deficits or surpluses on a day-to-day basis, this creates artificial tightness or ease, which the Fed feels compelled to offset and can do only with difficulty. Said one person at the Fed, “A major and not widely recognized problem is the distribution of reserves within the settlement period. If early in the period there is a shortage of reserves, even if we pump in reserves, the market may still be tighter than we like. And by pumping in all those reserves, we may be creating a problem because we are putting in more reserves than we can take out at the end of the period. The market is often incapable of handling a large amount—either because on the repo side they lack collateral or because on the reverse side we have exhausted the supply of banks that want to do reverses.

“Banks who do reverses with us are not as welcome at the discount window as they would be if they did not. So banks are reluctant to do reverses because they fear the money market might tighten and they might

⁴ As explained in Chapter 12, settlement by the banks is based on their average reserve balances over a two-week settlement period. So the Fed's concern is with the average reserve balances available daily to the banks over the settlement period. Which banks get or lose reserves as a result of Fed open market operations is of no concern to the Fed because banks with surpluses sell funds to banks with reserve deficits in the fed funds market.

have to come into the discount window. The rationale for this policy is that a bank should not borrow from us money that they have in fact lent us. The banks are discouraged from doing reverses and borrowing at the discount window even when they would be taking a loss on the *net* transaction, which at times they would be.”

Another difficulty the Fed may experience in trying to hit its target is that it may be forced at times to engage in large open market operations to offset shifts in Treasury balances or float. The danger is that the large resulting injections or withdrawals of reserves may—depending on market conditions—be mistakenly interpreted by the market as a signal of a shift in Fed policy.

Problems of this sort are the reason the Fed lobbied to have the Treasury hold the bulk of its deposit balances in TT&L accounts at private banks. Despite the Treasury’s new deposit arrangements, the Treasury must still keep sizable balances at the Fed. When these balances run low, the Treasury runs a risk, unless it puts in more money, of ending up *OD* (*overdrawn*) at the Fed. When this occurs, the Treasury issues the Fed special certificates, which are usually on the Fed’s books for no more than a day or two.

A Go-Around

The Federal Reserve’s New York-based open market desk is quite busy in the mornings, weighing the many factors that affect the amount of reserves in the U.S. financial system and thus, the federal funds rate. The desk begins its day at around 7:30 a.m. (ET), with analysts monitoring where fed funds are actually trading and assessing the various factors that might affect trading on that particular day. The day’s news and economic data and the performance of financial markets worldwide are all considered. From there, the Fed’s analysts begin the process of estimating the amount of supply and demand for reserves expected for the day. The process continues throughout the morning as new information pours in. At around 9 a.m., the open market desk holds a conference call with the U.S. Treasury Department to gauge the Treasury’s balance at the Fed. At around 9:20 a.m., the manager of the open market desk reviews the plan for the day—the so-called program that the desk plans to implement in its open market operations when it will either add or drain reserves from the financial system. The program is reviewed in a conference call with staff from the Federal Reserve’s Board of Governors in Washington and with one of four

voting presidents of the FOMC. Following the brief conference, the open market desk is then authorized to act, and it does so at around 9:30 a.m. when its decision on the day's open market operations is announced to the financial community. The Fed does this in what is called a *go-around*. It calls all the primary dealers in government securities and tells them that it wants to buy securities, sell securities, do repo, or do reverses and asks them for bids and offers, as the case may be. Technically, the Fed does not do reverses. Instead, it does an almost identical transaction called a *matched-sale purchase (MSP)*.⁵

When the Fed goes into the market to do normal, daily, open market operations, the size is usually large. A typical bill or coupon operation for the open market account averaged \$5.9 billion in 2004 and \$5.3 billion in 2003, ranging on average between \$5.3 billion and \$9 billion daily in 2004. During a peak add period, such as April or December, it is not unusual for the Fed to have much larger amounts of repos outstanding on a single day, sometimes as much as \$20 billion or more.

On securities purchases and sales, the Fed compares dealers' bids and offers with current market quotes and determines on which issues yields are most attractive and on which of these issues it has gotten the best quotes. It then does business with those dealers who have given it the highest bids or lowest offers on those issues.

To get current market quotes on government and agencies, the Fed asks the primary dealers in governments to give it quotes, hourly or more frequently, for a wide range of securities. Providing such quotes is a nuisance for the dealers, so the Fed rotates the job and supplements such queries with outside electronic pricing sources.

The word that a go-around is being done is flashed out to all the dealers within seconds. Thereafter, the process slows down a bit. It takes the dealers time to get back to the Fed with their offerings or bids, and then it takes the Fed time to compare the dealers' propositions and select the most favorable. For outright purchases, which take a bit longer, the average turnaround time in 2003 was just 4 minutes and 53 seconds.

In addition to its normal open market transactions with the dealers, the Fed uses transactions with foreign central banks that hold dollars as a

⁵ For more on the use by the Fed of repos and MSPs and on Fed transactions on behalf of foreign central banks, see Marcia Stigum's *The Repo and Reverse Markets* (Homewood, IL: Dow-Jones-Irwin, 1989), Chap. 8.

way to affect bank reserves. Such transactions are marginal on a long-term basis but can be significant in the day-to-day control of reserves. “Foreign accounts have buy and sell and repo orders every day,” said one person on the desk. “We can choose to be on the other side of any one of those transactions, which gives us flexibility. Say there is a big excess of reserves in the market. If we try to drain reserves, the market may conclude we are tightening further. But if we do transactions internally with foreign accounts, no one sees them, and no one is upset. Such transactions do what a market transaction would do without providing any signal.” In July 2005, the Fed held \$1.455 trillion of marketable Treasuries and U.S. agency securities in custody for foreign official and international accounts.

THE DISCOUNT WINDOW

In January 2003, the Federal Reserve revamped its rules surrounding borrowing from its discount window, which is a facility that allows banks to borrow from the Fed. The “discount window” is so called because there was once an actual window at the Fed’s district banks where banks dropped off collateral in exchange for loans. Many factors, including the 2003 regulations, have substantially reduced the amount of borrowing from the discount window. The amount has fallen from an average of \$1 billion per day during the period 1975 to 1990 to just \$42 million per day in 2004. Borrowings remained low in 2005 and 2006.

According to the Federal Reserve, all depository institutions that maintain transaction accounts or nonpersonal time deposits subject to reserve requirements are entitled to borrow at the discount window. These include commercial banks, thrift institutions, and U.S. branches and agencies of foreign banks. Prior to the passage of the Depository Institutions Deregulation and Monetary Control Act of 1980, discount window borrowing generally had been restricted to commercial banks that were members of the Federal Reserve System.

When a bank borrows at the discount window, reserves are created just as they are when the Fed does repos in the course of open market operations (Table 9.6). Back in the 1920s, granting banks loans at the discount window was the Fed’s main technique for creating bank reserves. Gradually, this technique of reserve creation was replaced by open market operations, and the primary function of the discount window today is to provide member banks and other depository institutions that encounter

TABLE 9.6

When a bank borrows \$50 million at the discount window, it increases bank reserves by a like amount

The Fed		The Borrowing Bank	
Bank borrowing +50MM	Reserves of borrowing bank +50MM	Reserves +50MM	Borrowing from the Federal Reserve +50MM

any one of a range of possible difficulties with a means to adjust in the short run.⁶

An institution's borrowings at the discount window must be collateralized. According to the old commercial loan theory of banking, it was proper for banks to make only *short-term* loans because their liabilities were short term in nature. Also, bank loans were supposed to be *self-liquidating*; that is, funding an activity that would automatically generate the funds needed to repay the loan. Finally, bank loans were to be *productive*; that is, to fund the production and marketing of goods not, for example, the carrying of securities. Influenced by this doctrine, the authors of the Federal Reserve Act stipulated that only notes arising from short-term, self-liquidating, productive loans are *eligible* as collateral at the discount window. Notes not meeting these conditions are deemed to be *ineligible* collateral.

Satisfactory collateral for extensions of credit from the discount window include Treasuries and federal agency securities; and, if of acceptable quality, mortgage notes covering one- to four-family residences; state and local government securities; and business, consumer, and other customer notes. What banks use as collateral at the window has varied over time. There was a time when banks borrowed at the discount window almost exclusively against governments. Then, large banks began repoing their government portfolios and using customer promissory notes as collateral.

⁶ It used to be that just member banks could borrow at the discount window. Then foreign banks were given access to the window by passage in 1978 of the International Banking Act. Finally, all domestic depository institutions were given access to the window by passage in 1980 of the Monetary Control Act.

New Rules Regarding Discount Window Borrowing

As mentioned earlier, in January 2003 the Federal Reserve adopted new rules governing discount window borrowing. The Fed had several objectives:

- To reduce some of the administrative burdens associated with discount window borrowing
- To reduce the stigma that institutions have had in the past when they considered borrowing from the Fed
- To eliminate any perception of a subsidy for discount window borrowing

In order to achieve its objectives, new rules were established with respect to the eligibility requirements for discount window borrowing as well as the interest rate charged to borrowers.

Specifically, to make it easier for healthy banks to qualify for loans, the Fed relaxed many restrictions that had previously hindered borrowing. For example, in establishing a two-tiered eligibility system for the extension of *primary* and *secondary credit*, depository institutions deemed by the Fed's district banks to be in generally sound financial condition would be eligible to obtain short-term financing if they met a set of criteria. These criteria include capitalization and examination ratings, as well as supplementary information such as information that can be gathered from the financial markets, if applicable. Unlike the way things had been handled in the past, borrowers meeting the criteria for the primary credit facility would no longer have to exhaust other sources of funds before attempting to borrow from the discount window and they could also use the window to finance their sales of federal funds.

Reducing the Stigma

The implementation of the new primary credit facility was expected to reduce the stigma previously associated with borrowing at the discount window because only generally sound institutions would be eligible for primary credit. The Fed believes that market participants are now less likely to find a reasonable basis for inferring that an institution might be unsound just because it may have borrowed from the primary credit facility. Helping to reduce the stigma is the elimination of the requirement that borrowers make their funding needs known to the market—a key source

of stigma in the past. The Fed's measures appear to be changing the way that depository institutions perceive the discount window, as indicated by views expressed by banking supervisors who have said that, "Occasional use of primary credit for short-term contingency funding should be viewed as appropriate and unexceptional by both [bank] management and supervisors."⁷ Although Federal Reserve banks do not disclose the names of depository institutions that borrow money from the discount window, inferences were once made from a Reserve Bank's lending when it was combined with indications of a particular depository institution's search for funds and/or rumors of any funding problems the institution might be having. The implementation of the primary credit facility is expected to sharply alter the drawing of such inferences.

The Discount Rate

A major aspect of the January 2003 rules relates to the interest-rate level that the Fed charges for the loans that it makes through its discount window.⁸ Before the new rules took effect, the discount rate was below the fed funds rate, usually by either a quarter or a half of a percentage point. The Fed guarded against any arbitrage between the discount rate and the fed funds rate, particularly because unchecked arbitrage would expand the quantity of bank reserves, resulting in a lowering of the fed funds rate and an expansion of the liquidity available for economic expansion. Any efforts to correct such a problem via open market operations would be futile because if the operations were to succeed in raising the fed funds rate, arbitrage between the discount rate and the fed funds rate would resume.

The 2003 ruling set new rates for discount window borrowing. The primary credit rate was set at 100 basis points over the fed funds rate, and the secondary credit rate was set at 150 basis points over the fed funds rate. The presence of the discount window should serve as a cap on the fed

⁷ See the Federal Reserve's July 23, 2003, press release, "Agencies issue guidance on appropriate use of discount window."

⁸ In 1971, the Fed switched from actually discounting paper at the window to making straight loans against collateral. As a result the discount rate is not quoted on a discount basis as Treasury bill rates are; instead the discount rate is an add-on rate that is directly comparable to the fed funds rate, which is also an add-on rate. In making the 1971 switch in window practice, the Fed's motive was to simplify lending at the window. The change also permitted banks to borrow more dollars against a given amount of collateral.

funds rate because it provides an additional means for depository institutions to obtain funding. The above-market rates serve as a rationing mechanism that sharply reduces the need for supervisory review of the potential borrower.

Other Faces at the Window

With passage of the International Banking Act (IBA) in 1978 and of the Monetary Control Act in 1980, the borrowing constituency of the Fed was raised from 5,000 member banks to 40,000 institutions, broadening the scope of the availability of the Fed's discount window.

Foreign Banks

Since most foreign banks have U.S. branches or agencies at large, one would have expected them to do at least a test borrowing at the Fed to learn the procedure in preparation for the day when they really needed a loan from the window. A few have done so, but the number is small. Most foreign banks still rely on their domestic correspondent bank as a lender of last resort.

Since foreign banks must hold reserves at the Fed only against the deposits they book in the United States, their required reserves are small compared to those of domestic banks of similar size. Whereas a Citibank or a Morgan might have required reserves of \$1 billion, the comparable figure for a foreign bank might be only \$10 million. Yet when they both need to borrow at the window, the size of the borrowing needs of both classes of banks is likely to be similar. The Fed recognizes this and has said in effect to the foreign banks, "We are as willing to lend you \$100 million as we are to lend the same amount to Citi, but since you hold much smaller reserves on average than Citi, we'd expect you to come to the window much less often than it does." That is the Fed's way of respecting the IBA requirement that loans made at the discount window to a bank be related in size to the reserves held by that bank at the Fed. Foreign banks are subject to reserve requirements under Regulation D in the same manner and to the same extent as depository institutions.

Nonmember Banks and Thrifts

Most nonmember banks are liquid institutions and are normally sellers, not buyers, of fed funds. As noted below, an institution that sells fed funds is not supposed to simultaneously borrow at the discount window

because this could result in a profitable arbitrage. The purpose of the window is not to increase profits of depository institutions by creating the opportunity for them to engage in risk-free, for-profit arbitrage.

After passage of the 1980 Monetary Control Act, the Fed published a pamphlet, *The Federal Reserve Discount Window*, to acquaint its new borrowing constituency with discount window practices.

Bank Attitudes toward Discounting

The Fed takes the position that access to the discount window is a privilege and that institutions should borrow there only when they have a legitimate need and then only for reasonable amounts and periods. For primary credit, credit can be extended only on a very short-term basis, usually overnight, as a backup source of funding. Funding may be extended for a longer period of time, for as much as a few weeks, if, in the judgment of the Reserve Bank, the institution is in generally sound financial condition and cannot obtain credit in the market on reasonable terms.

For secondary credit, funding can be extended on a very short-term basis, usually overnight, as a backup source of funding for depository institutions that are not eligible for primary credit if, in the judgment of the Reserve Bank, such a credit extension would be consistent with a timely return to a reliance on market funding sources. Funding may be extended for longer periods of time if the Reserve Bank determines that such credit would facilitate the orderly resolution of serious financial difficulties of a depository institution.

Seasonal credit can be extended by Reserve Banks for periods longer than those permitted under primary credit to assist smaller depository institutions in meeting regular needs for funds arising from expected patterns of movements in its deposits and loans. The program for seasonal credit was established in 1973, when the Fed instituted a program for providing seasonal credit to smaller banks that lacked access in the national money market. The purpose of the program was to meet anticipated borrowing needs for banks in resort communities, agricultural regions, and other areas where local businesses need to borrow funds early in the seasonal cycle and make their profits later. To qualify for the program, banks must show a consistent pattern of seasonal borrowing needs over a period of years. The terms of the program were simplified for agricultural banks in order to channel more credit to areas hit by the farm depression, but the impact was minimal.

The amount of borrowing under the seasonal credit program has actually exceeded borrowing from the new primary credit facility. In 2004, the daily average for seasonal borrowing was \$110 million compared to \$42 billion of primary borrowing.

Reserve banks are authorized, “in unusual and exigent circumstances” and after consultations with the Board of Governors, to extend credit to an individual, partnership, or corporation that is not a depository institution if, in the judgment of the Federal Reserve Bank, credit is not available from other sources and failure to obtain such credit would adversely affect the economy. The interest rate charged on such credit would be above the highest rate in effect for advances to depository institutions. Such credit was used in the 1930s to grant about 125 loans totaling a mere \$1 million, but it has not been used since. Other sorts of federal subsidies or assistance, the Fed believes, should be granted only by decisions of Congress and the administration, not by an independent central bank.

Most banks, typically large banks, regard the discount window as what it truly is—a lender-of-last-resort facility that they use occasionally because they experience difficulty in settling on a Wednesday owing to an unexpected occurrence: a clearing bank gets hit by dealers’ loans late on a Wednesday when fed funds are in short supply; a bank experiences large unanticipated withdrawals; or a bank makes a mistake in tracking its reserve position.

The Fed’s Attitude toward Discounting

Today the Fed uses open market operations to make overall adjustments to reserves. The impact of such aggregate actions can differ for individual banks. The Fed views the discount window in part as a safety valve for those banks that are adversely affected by actions taken on the open market desk. The 2003 rule changes make it clear that the Federal Reserve wants banks to use the window as needed and with no stigma attached and without burdensome rules governing such. Moreover, from the desk’s point of view, it is valuable to know that the discount window is there because it allows the desk to take actions it otherwise might hesitate to take because of the potential impact on individual banks.

Settlement date is the most likely time for larger banks to come to the discount window. On a Wednesday settlement date, such banks can find their position much shorter than they anticipated, and rates can get out of hand in the fed funds market on Wednesday afternoon. The reserve

period ends on Wednesday, so that is the day banks make final settlement with the Fed (Chapter 12). The Fed takes the position that, if the choice facing a bank on a Wednesday is between paying an “exorbitant” rate for funds and coming to the discount window, it should come to the window.

“Informational” and Other Calls

If an institution continues to borrow at the window, the Fed—taking into consideration the amount of the borrowing, the bank’s past borrowing record, its frequency of borrowing, and conditions affecting banks of its type at that time—may eventually conclude that the borrowing is moving outside the range of the typical need.

In such a case the Fed in the past has made *informational calls*. This, from the Fed’s point of view, has no stigma attached to it. The Fed is trying to get a fix on where the bank is and on how much longer it expects to rely on the Fed. The call lets the bank know that it has reached a point where the Fed is taking an interest in it, and it gives the bank an opportunity to tell the Fed what its problems are and what it is doing to cope with them. Normally this suffices, and within a few weeks the bank will have taken steps to cope with its problems—cut loans or seek new deposits.

But if an additional period goes by and no improvement occurs, the Fed could make a second *administrative counseling call*. The purpose of this call is to tell the bank that its borrowing pattern is becoming atypical or excessive and that it is time for the bank to terminate its borrowing. Normally, such a call will end the borrowing. The Fed has rarely had to make a final call to say that the bank must terminate its borrowing as of a certain date.

Reverses and Loans at the Window

The Fed has an administrative rule stating that an institution should not do reverses with the Fed if it expects at the time that it might borrow from the Fed during the settlement week. The rationale for this rule is to prevent banks from using the window to fund a profitable arbitrage. However, there are qualifications to this rule. If a bank thinks it is in good shape with respect to its reserve position and does reverses and then something changes in the interim—operational problems or whatever—the Fed would not object to the bank borrowing at the window. Also, there is no problem in borrowing if a bank acts as a conduit for customer funds in doing reverses.

The Fed has an additional rule that an institution should not be a net seller of fed funds during a period in which it borrows at the discount window. This again is to prevent borrowing at the discount window from being part of a for-profit arbitrage.

Extended Credit

Banks

With the implementation of the new primary and secondary credit facilities in January 2003, the Fed's extended credit program has been eliminated. In the past, extended credit was given to institutions encountering fundamental problems, particularly for acts of God—floods, hurricanes, or whatever. In such a situation a group of banks could be adversely affected, as well as their borrowers or their depositors; for example, a hurricane shuts down a number of businesses and causes them to withdraw deposits from local banks. Such a situation would call for prolonged loans to the affected banks and a program to restore the banks to financial health.

The Fed has also provided extended credit to single banks when in the Fed's judgment the risks to the banking system as a whole were sufficiently high enough to warrant providing credit while another situation is worked out. In 1974, the Fed lent nearly \$2 billion to Franklin National at one point while trying to stave off a collapse of that bank. In 1984, the Fed lent as much as \$7 billion at times to Continental Illinois, a record amount that stands to this day, while the authorities were putting together a rescue package for that bank.

For a while, the financial turmoil of the 1980s led to an increase both in the number and in the size of extended credit loans made by the Fed. Today, it is no longer routine for the Fed to have substantial amounts of extended credit loans on its books.

Emergency Credit

So far we've discussed three facilities that the Fed uses to lend money to institutions via its discount window: primary credit, secondary credit, and seasonal credit. A fourth facility is *emergency credit*, which is available to institutions in the event of a disruption to the U.S. money markets resulting from an act of war, military or terrorist attack, natural disaster, or other catastrophic event.

According to the Fed, in order to ensure the Federal Reserve Board's determination to lower the discount rate in response to a financial emergency,

the primary rate can be lowered in the absence of a quorum of the Board. In other words, in an emergency the primary credit rate will be reduced to the Fed's target federal funds rate if in a financial emergency a Reserve Bank has requested that the primary credit rate be established at the target federal funds rate and the Chairman of the Board (or in the absence of the chairman, his designee) certifies at the time of the financial emergency that a quorum of the Board is not available. These rules were formulated with the events of September 11, 2001, in mind, when the Fed needed to make monetary policy and lending decisions quickly.

The Federal Reserve Banks have established analogous internal procedures to address the possibility that their boards of directors or other duly authorized officials might be unavailable or otherwise unable to communicate a rate request to the Board in a timely manner during a financial emergency.

Extended Credit and Deposit Insurance

The Fed's activities as lender of last resort overlap those of the federal deposit-insurance agencies. A troubled bank often becomes *illiquid* before it becomes *insolvent*; and if it suffers a deposit run, the Fed's discount window is an appropriate, temporary life-support system for it. The Fed's credit facilities can serve as a way station for banks and thrifts on the road to insolvency [and to a takeover by the Federal Deposit Insurance Corporation (FDIC) or the Federal Savings and Loan Insurance Corporation (FSLIC)].

Even after the FDIC or FSLIC intervenes, the Fed may still have a role, especially given that not all bank deposits are insured. In the past, the FDIC and FSLIC often found it convenient to let the Fed lend money to an institution being reorganized rather than to deplete their own cash reserves; then, when the reorganization was complete, the insurance fund often assumed responsibility for the discount-window loans of the bailed-out institution as part of the final workout plan. The Continental Illinois bailout was the largest transaction of this type, but the Fed and FDIC made other similar deals. The advantage of this mechanism is that it allows the FSLIC or the FDIC to inject capital into a failed institution without wiping out its own cash position; instead, the federal insurer mortgages a portion of its future premium income to the Fed to pay off current claims. Such a system is needed only because banks and thrifts have always lobbied successfully to keep deposit-insurance premiums and thereby federal-insurance reserves down to a bare minimum.

RESERVE REQUIREMENTS

One of the tools available to the Fed but which is rarely used as such is the Fed ability to alter reserve requirements. Reserve requirements refer to the amount of money banks are required to keep in reserve against their existing capital. This is done to provide a safety net of sorts. Since the early 1990s, banks have been required to maintain reserves only against transaction balances (basically interest-bearing and non-interest-bearing checking accounts). Banks keep their reserves in either vault cash or in a non-interest-bearing account held by a Federal Reserve Bank. Reserve requirements are tailored in a way that puts more of a burden on large institutions than on smaller ones. For example, for institutions holding net transaction balances of \$6.6 million or less, there is no reserve requirement. For institutions holding balances of over \$45.4 million, the reserve requirement is \$1.164 million plus 10% of the amount over \$45.4 million. There is no reserve requirement for nonpersonal time deposits and for Eurocurrency liabilities.

When the Fed decreases reserve requirements, it expands the money supply and economic growth because it alters the volume of deposits that can be supported by a given level of reserves, and bank funding costs. The opposite is true when the Fed raises reserve requirements. This tool is very rarely used as a means of transmitting the Fed's monetary policies and is used mostly as a means of regulating the soundness of the banking system.

Reserve requirements were used regularly as a policy tool in the 1960s and 1970s, but were not used at all during the 1980s following the passage of the Monetary Control Act of 1980 (MCA), which facilitated monetary control by reforming reserve requirements. Under the act, all depository institutions are subject to reserve requirements set by the Federal Reserve, whether or not they are members of the Federal Reserve System. The MCA permits the Federal Reserve Board, under certain circumstances, to establish supplemental and emergency reserve requirements. Reserve requirements were last used as a policy tool in December 1990 when the required reserve ratio on nonpersonal time deposits was reduced to 0% from 3%, and then in 1992 when the reserve ratio on transaction deposits was reduced to 10% from 12%. The Fed cut these ratios in response to the tightening of lending standards that was taking place at that time.

The level of required reserve balances has fallen sharply since the early 1990s, but the decline is unrelated to the changes in reserve requirements. Widespread implementation of retail sweep programs, in which depository institutions sweep amounts above a predetermined level from

a depositor's checking account into a special-purpose money market deposit account created for the depositor, has reduced the amount of required balances. There is a clear economic incentive for this: by lowering their required reserve balances, on which no interest is paid, depository institutions can shift the money into interest-bearing assets.

SOME HISTORY

Before we look at how the Fed operates today, a few words on history. During World War II, inflation was one extra disruption that the nation could do without. Thus, during the war the appropriate stance for monetary and financial policy would have been for the federal government to raise taxes to cover as much of the war expenditures as possible and for the Fed to pursue simultaneously a policy of restraint to discourage private spending. This, however, was not done. Taxes were held down so as to not discourage incentives, and rationing and price controls were used to contain private spending and control the price level. Meanwhile, the Fed assumed responsibility for pegging interest rates at the low levels that prevailed when the country entered the war. The rationale was to encourage individuals and institutions to buy bonds by eliminating the price risk that would normally be attached to holding such securities. The policy had the additional advantage of minimizing the cost to the Treasury of financing the burgeoning national debt.

In guaranteeing to buy whatever quantity of government securities was necessary to peg both long- and short-term interest rates at low levels, the Fed lost all control over the money supply; and its policy permitted a big buildup of private liquidity. In retrospect, this buildup was not totally undesirable because the liquid assets acquired by citizens during the war permitted them to finance at the war's end the purchase of cars and other goods that had been unavailable during the war. The resulting spending spree prevented a much-feared postwar slump.

Inflation, however, did arrive on the scene. By 1948, the Fed was feeling uncomfortable about its obligation to peg bond prices, since that left it with no tool to fight inflation. The recession of 1949 provided some relief, but inflation again became a problem during 1950 when the Korean War broke out. Again, the Fed wanted to tighten but the Treasury resisted, arguing that higher interest rates would disrupt Treasury refundings, increase the cost of financing the national debt, and inflict capital losses on those patriotic individuals and institutions that had bought bonds during the war.

Finally, the Fed threw the gauntlet down to the Treasury in September 1950 by raising the discount rate. The Treasury retaliated by announcing a one-year financing based on the old discount rate of 1.25%. Rather than allowing the financing to fail or rescinding the rate increase, the Fed bought the Treasury's new issue, stuck to its higher discount rate, and then resold the issue to the market at a slightly higher rate. This started a six-month battle with the Treasury, ending in the famous March 1951 *accord* between the Fed and the Treasury, which read:

The Treasury and the Federal Reserve System have reached full accord with respect to debt management and monetary policies to be pursued in furthering their common purpose to assure the successful financing of the government's requirements and, at the same time, to minimize monetization of the public debt.

This statement, despite the fact that it appears to be a prime example of "governmentese" that says nothing, was important. Its key phrase, "to minimize monetization of the public debt," gave the Fed the right to henceforth pursue an independent monetary policy. The following year, the Fed, to protect its flank, adopted a policy of *bills only*; in the future, the Fed would confine its purchases of governments largely to bills. In adopting this policy, the Fed was saying to the market and the Treasury that henceforth the market would set the yield curve and in particular the yields on Treasury bonds.

As a price for its accord with the Treasury, the Fed agreed to stabilize credit-market conditions during Treasury financings. This policy, known as *even-keeling*, was pursued for years. The reason such stabilization was required was that the Treasury used to fix both the coupon and the price at the time it announced a new issue on Wednesday. Thus, if anything important had happened after the announcement of an issue but before it was sold the following week, that would have killed the auction; that is, the Treasury would have been unable to sell its securities—something that neither the Treasury nor the Fed could risk.

While even-keeling prevailed, the Fed tried to plan major moves so that the market would have time to react to them before a Treasury financing. It insisted, however, that Treasury financings meet the test of the market; the Treasury could not rely on direct support from the Fed.

In the 1970s, even-keeling gradually died away. One reason is that the Treasury adopted the policy of selling almost all of its coupon issues through yield auctions. Also, the Treasury's new policy of auctioning

notes of different maturities on a regular cycle created a situation in which the Treasury is in the market twice a month with new coupon issues. If the Fed were to even-keel, it would have no “windows” during which it could decisively shift policy.

Before the accord, the Fed was forced to focus almost solely on interest rates. After the accord, the Fed's focus gradually shifted to *free reserves*—excess reserves minus borrowed reserves. The Fed reasoned that the stance of monetary policy would be sufficiently easy during a recession if free reserves were increased, thereby promoting additional bank lending and falling interest rates. Furthermore, during periods of excessive demand for output, the stance of monetary policy would be appropriately tight if free reserves were decreased, thereby promoting a reduction in bank lending and a rise in interest rates.

This reasonable-sounding policy contained a fatal flaw. During a recession, interest rates are likely to fall by themselves as the demand for bank credit diminishes, so increases in free reserves may be consistent with a falling money supply and a tight monetary policy. In an overheated economy, in contrast, limiting free reserves to some small sum need not mean tight money. So long as the Fed continues to supply banks with reserves and the banks use them, a policy of holding free reserves to a low figure is consistent with a rapidly expanding money supply.

After a decade of obsession with free reserves, the Fed in the early 1960s shifted focus to interest rates. At the time, the economy was recovering sluggishly from a severe recession, and the Fed wanted to stimulate investment spending by lowering long-term interest rates. However, the United States was also experiencing a big deficit in its balance of payments, and defense of the dollar therefore called for the Fed to maintain high short-term interest rates. In response to both needs, the Fed adopted *operation twist*: it started buying bonds instead of bills in an attempt to force up short-term interest rates while simultaneously lowering long-term rates.

Whether operation twist was successful in altering the slope of the yield curve, in stimulating investment, or in decreasing the balance of payments deficit has been much debated. The policy died in 1965, a victim of the Vietnam War, which set off inflationary pressures in the economy and caused the Fed to focus on curbing inflation. In 1966, the Fed introduced the first of several credit crunches that drove interest rates to historical highs.

As fighting inflation came to be a key target of Fed policy, another change was also occurring—a gradual shift in the Fed's attention away

from interest rates toward growth of the money supply. The level of interest rates does not necessarily indicate how tight or easy monetary policy is because interest rates respond not only to what the Fed is doing, but also to general economic conditions. During a recession, interest rates can fall even though bank reserves and money supply are shrinking. Similarly, during an expansion, rising interest rates are compatible with rapid increases in bank reserves, bank credit, and money supply.

Thus, in the decade following 1966, during which the Fed continued to be concerned much of the time with controlling inflation, it gradually put, in measuring monetary tightness and ease, more emphasis on the rate of growth of the money supply and less on that of bank reserves. This switch in focus was encouraged by Congress, which in a 1975 joint resolution required the Fed to set and announce targets for monetary growth.

Congress's action reflected growing national frustration with the Fed's inability to stem, during the 1970s, the growing tide of inflation. This frustration made people lend a more sympathetic ear to monetarist railings about the *Fed's judgmental* approach to policy making. Monetarists, most prominently Milton Friedman, had long argued that a judgmental approach invited political meddling and human error; also, it was unnecessary, since a *rigorous* pursuit of publicly announced, money-supply targets would suffice to control inflation. This claim had much appeal and eminent proponents. Given the Fed's poor track record on inflation, many people—even those skeptical about monetarism's easy answers—felt it was time to try a new approach.

Prodded by Congress, the Fed began to set money-supply targets and sought to hold growth of the monetary aggregates within target bands. At the same time, the Fed did not fully accept monetarist doctrine: from long experience, Fed technicians knew that the Fed could not control money supply with the precision envisioned in textbooks.⁹ Also, Fed officials feared the instability that rigid monetary control might foster. In any case, the Fed's conversion to monetarism was half-hearted, at least, until October 1979.

⁹ Because of its difficulty in controlling precisely—even gauging precisely—the size of the money supply by any measure, the Fed had in 1972 adopted as an operating policy target bank reserves available to support private deposits (RPDs). The idea was that, by controlling this aggregate, the Fed could control closely, albeit indirectly, the money supply available to the private nonbanking sector, that is, the total money supply minus Treasury balances at commercial banks and interbank deposits, both of which are excluded from Fed money-supply figures. After several years, the Fed gave up on this experiment because RPDs proved as difficult to control and measure as money supply.

THE MONETARIST EXPERIMENT: 1979 TO 1982

The year 1979 was tumultuous; a vicious cycle of rising inflation and a depreciating dollar were undermining confidence in U.S. financial markets. Under pressure to find a strong figure to take the helm at the Fed, President Carter appointed Paul Volcker, then president of the New York Fed, to be Federal Reserve chairman. On Saturday, October 6, 1979, Volcker convened a special session of the FOMC to discuss how to meet the crisis. At day's end, the Fed released a short statement announcing large changes in how it would henceforth implement monetary policy. In doing so, the Fed formally inaugurated what was to become a three-year monetarist experiment.

The “Saturday Night Special”

The Fed's October 6 announcement revealed few details about the FOMC's new policy approach, but it said enough to tell the markets that the financial world had changed suddenly and dramatically. The key words in the announcement were that the new approach “involves placing greater emphasis in day-to-day operations on the supply of bank reserves and less emphasis on confining short-term fluctuations in the Federal funds rate.” That would prove to be the understatement of the decade: the October 6 announcement kicked off a three-year period of extraordinary volatility in the funds market (Figure 9.1). The uncertainties of the new era had an immediate negative impact on bond prices, which plunged after the weekend. Wall Street traders, feeling as though they'd been mugged, quickly dubbed the announcement *Volcker's Saturday Night Special*.

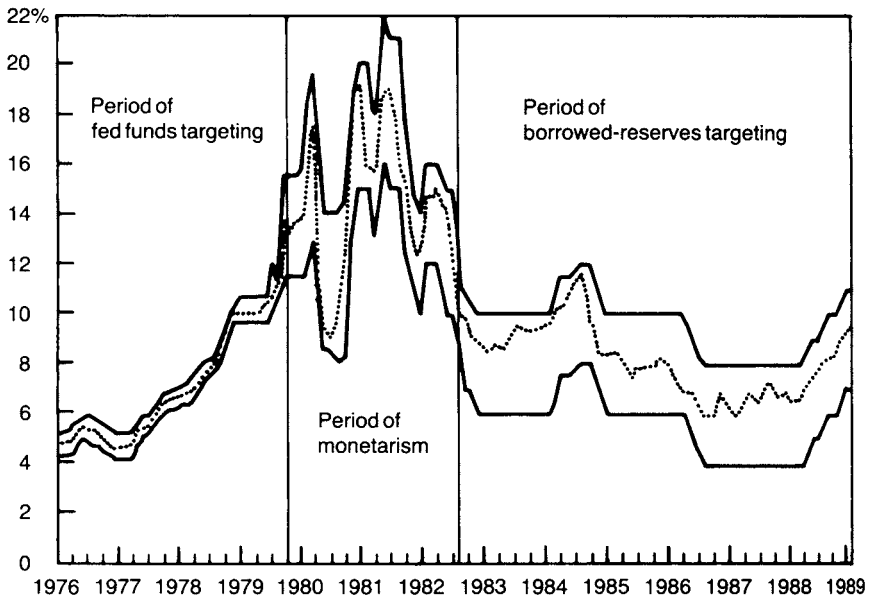
A Reserves-Oriented Operating Procedure

In a nutshell, the October 6 announcement ushered in a *reserves-oriented* operating procedure designed to achieve tighter control over money supply. The Fed had previously established money-supply targets, but it did a poor job of achieving them.

Prior to October 1979, the Fed relied on a *fed funds targeting* procedure: the FOMC held the fed funds rate within a narrow band it established; if money supply grew faster than desired, the FOMC would raise its target band for the funds rate in an attempt to restrain the demand for money and thereby bring the rate of growth of money supply down into its target range.

FIGURE 9.1

Federal funds rate effective versus monitoring range
(monthly levels)



Source: R. W. Wrightson & Associates, Inc.

By switching to a reserves-oriented procedure, the Fed intended to attack money-supply growth from a different angle. Instead of using marginal changes in interest rates via marginal changes in the rate of growth of bank reserves to influence the demand for money, the Fed would supply just enough bank reserves to support its targeted level of money growth, without regard to how that affected interest rates. When money supply grows, the need for bank reserves rises as well; in the past, the Fed, desiring to prevent short-run volatility in the funds rate, accommodated such induced increases in the demand for bank reserves through open market operations. Under its new procedures, the Fed would let the increased demand for bank reserves translate immediately into higher interest rates that would persist as long as money-supply growth exceeded target rates.

Why the Fed Acted

Various theories have been advanced as to why the Fed decided to don a monetarist guise in 1979. The simplest explanation—that the Fed believed

in monetarism—usually gets the shortest shrift. Comments made by many Fed officials (including Volcker) before, during, and after the monetarist experiment betray a deep mistrust of rigid monetarist doctrine.

The more plausible explanation for the Fed's shift in policy is political. The wide acceptance that monetarism was gaining—among the public, the press, and politicians—put the Fed under pressure to give it a try. Congress, in particular, was taking on an increasingly monetarist cast; and each year it appeared to be coming a little closer to circumscribing the Fed's autonomy. By taking the initiative in October 1979, the Fed was able to implement monetarism *on its own terms*.

Also, the new operating procedures offered the Fed invaluable political cover for the drastic anti-inflation program it knew was needed. Two things stand out about the monetarist experiment: during its life, interest rates were on average *far higher* and *far more volatile* than they were immediately before or after.

There's no good reason why money growth can't be controlled as easily by managing interest rates as by managing reserves, but doing the former creates a political problem: under a fed funds targeting system, the Fed must accept full responsibility for each and every rise in interest rates. Consequently, it's no surprise that the Fed was slow in the 1970s to push interest rates as high as they needed to go. However, by becoming monetarist, the Fed was able to disavow responsibility for spikes and swings in interest rates—swings were merely unfortunate side effects of the noble quest for a stable rate for growth of the money supply.

On this interpretation, the volatility of interest rates from 1979 to 1982 was an essential part of the Fed's strategy. Had the new operating procedures produced high but stable interest rates, the Fed would have been hard pressed to argue that it had no control over interest rates. However, by allowing rates to lurch about month to month, the Fed created a convincing picture of an economic variable beyond its control; this picture, perhaps disingenuous, served its purpose. It allowed the Fed to keep rates high enough for long enough to cool the engine of inflation, which had been building up steam for years.

The M1 Game

The volatility that the Fed permitted during the monetarist experiment elevated the Fed's M1 measure of money supply, its narrowest measure of the money stock, to a position of unrivaled prominence. Of all the Fed's money measures, M1 looked most like the concept used in monetarist models; it consisted (originally) of currency in circulation plus demand

deposits at banks; also, it was the money-supply measure most closely related to bank reserves (many of the items in the broader aggregates, M2 and M3, aren't subject to reserve requirements).

Thus, the Fed's weekly release of the M1 number became *the* central event in each week's money and bond market trading. The Fed cautioned that its weekly M1 numbers were tentative and could be highly misleading, but its warning fell on deaf ears. The market knew that, under the Fed's new semiautomatic operating procedures, a \$2 billion or \$3 billion deviation from the M1 target might suffice to drive short-term rates up or down. Thus, the market's focus fixed on M1.

The Street put an extraordinary amount of effort into forecasting M1. Economists poured over the money-supply data looking for clues as to the coming week's number. Banks and others developed elaborate deposit surveys designed to allow them to predict the Fed's weekly tabulations. The general quality of private forecasts was poor, but that reflected flaws in the available data, not any lack of effort or ingenuity by those who massaged those data.

End of Experiment

By the summer of 1982, the nation's patience was wearing thin. The economy was falling deeper into the second recession in three years. Financial strains were growing in many sectors, including the less developed country (LDC) debtor nations (Mexico, in particular, appeared to be tottering on the brink of default). Also, and equally important, U.S. inflation indices were turning in their best performances in a decade. Finally, implementation of the new operating procedures had gotten no easier with time; the problems associated with measuring money supply multiplied in the early 1980s as Congress deregulated the financial system.

In August 1982, the Fed, uncertain about how to interpret money-supply numbers and uneasy about the path down which those numbers were leading it, abandoned its reserves-oriented approach. Its retreat from monetarism was not accompanied by the fanfare that greeted its conversion, three years earlier, to monetarism. In fact, some months passed before the Fed formally acknowledged its shift. However, in retrospect, it's clear that a fundamental change occurred in the summer of 1982: after August of that year, month-to-month swings in the funds rate became far smaller than they had been previously. Finally, the funds market regained some of its pre-1979 stability.

Measurement Problems

One problem that plagued the Fed throughout its monetarist experiment was the question of how to define and measure money supply: Which money-supply concept is *the* relevant one? Is it narrow M1, currency plus checking accounts? Is it M2, which incorporates a range of *near monies*, such as savings accounts and consumer time deposits and money market funds? Or is it M3, which adds in large-denomination instruments such as wholesale CDs, large money funds, and repurchase agreements? Different criteria support different money-supply aggregates: M1 is closest to the monetarists' textbook model, but in recent decades, the broader aggregates have shown the most stable relationship to GDP and to inflation. M3 has the advantage of being the most inclusive. An academic economist noted the irony of the situation: "Economists can't figure out how to define money supply, but whatever it is, they're sure it should grow at 3% a year."

When the Fed opted for M1 as its target, its decision making was far from over. The inflationary pressures that prompted the Fed's switch to monetarism also revolutionized the financial system. In the 1970s, as inflation rates and nominal interest rates both soared, a host of new financial instruments were created: money market funds, negotiable order of withdrawal (NOW) accounts, Super-NOW accounts, money market deposit accounts (MMDAs), consumer CDs, and so on. To keep pace with the rapidly evolving financial landscape, the Fed had to keep redefining its measures of money supply (Table 9.1). In this environment, M1 quickly ran afoul of Goodhart's law, which a Bank of England official phrased as follows: "If you create a monetary aggregate and start targeting your system by it, before you know where you are, it will change out of all recognition; and you will have to create another one—exactly what happened in the U.S. and in the U.K."

For the Fed, the introduction of NOW accounts proved to be a classic case in point. During the 1970s, NOW accounts became available in New England; by 1979, they had spread to New York and New Jersey; and beginning in 1981, Congress authorized their issuance nationwide. When NOW accounts were available only regionally, the Fed published two definitions of the narrow money stock: M1-A, which didn't include NOWs, and M1-B, which did. Then, when NOWs went nationwide, the volume of savings balances flowing into the narrow money supply soared. In response, the Fed published estimates of what its money-supply numbers would have been absent these shifts. Suddenly, four aggregates were competing to fill the shoes of old M1: M1-A, M1-B, shift-adjusted M1-A,

and shift-adjusted M1-B. The easy answers promised by monetarists were beginning to look complicated indeed. The point here is that not only do policy makers have the difficult choice of picking which money aggregate to watch, but they must also contend with the fact that the definition of what constitutes the money supply is constantly changing. Moreover, the relation between growth in the money supply and growth in the economy—known as *velocity*—can vary a great deal, making it even more difficult for policy makers to use the money supply as a guide to policy changes.

IMPLEMENTING MONETARY POLICY TODAY

The 1980s saw a switch, first dramatic, then gradual, in the procedures followed by the Fed in implementing monetary policy. It evolved during the 1990s into the interest-rate targeting regime we know today.

A Nonborrowed-Reserves Procedure

During its monetarist experiment, the Fed relied on a *nonborrowed-reserves procedure*. (Nonborrowed reserves are those that the Fed supplies to the banks via open market operations.) During its monetarist period, the FOMC would establish a short-run target for M1. Its staff would then estimate weekly the amount of bank reserves required to support this M1 target. The desk's job was to supply this amount of reserves *minus* banks' anticipated borrowings at the discount window. When M1 deviated from its target path, as it often did, bank borrowings at the discount window had to rise (or fall), which in turn would cause the fed funds rate to rise (or fall). The Fed's focus on supplying a fixed amount of nonborrowed reserves inevitably led to the erratic movements in the funds rate that occurred from 1979 through mid-1982.

A Borrowed-Reserves Operating Procedure

As the 1982 recession deepened, the Fed concluded that the economy was too fragile to support either the level or the volatility of interest rates that had been induced by strict M1 targeting. Accordingly, it shifted emphasis from nonborrowed to borrowed reserves.

Under the Fed's old operating procedure, the spread between the discount rate and the funds rate assumed crucial importance. Until 2003,

the Fed typically set the discount rate below the overnight rate for fed funds. Thus, a bank that borrowed reserves at the window rather than in the market got an instant saving—against which it paid certain nonprice costs: the risk of incurring the Fed's displeasure and the risk that the window might be unavailable on some future rainier day.

The greater was the spread of the funds rate over the discount rate, the greater was the incentive for banks to borrow at the window. Thus, it was no surprise that a quite stable relationship appeared to prevail between the spread of the funds rate over the discount rate and the amount of reserves banks borrowed at the discount window.

Under its borrowed-reserves procedure, the Fed sought to use this relationship as its handle on the funds rate. Specifically, the New York desk deliberately undersupplied reserves through its open market operations and thereby forced the banks to make up the deficit by borrowing at the window. The amount that the Fed chose to force the banks to borrow at the window determined how high funds would trade above the discount rate.

Specifically, under its *borrowed-reserves procedure*, the Fed tried to keep banks' borrowings at the window constant by adjusting nonborrowed reserves to meet short-term changes in banks' demand for reserves. The Fed changed its targeted level of borrowing only when it made a formal decision to change its policy stance. When the FOMC decided to tighten or ease, it directed the desk to try to induce \$100 million more (less) of daily borrowing at the window, knowing that this would likely translate into a 25- or 50-bp rise (fall) in the funds rate—the latter being the Fed's intermediate objective.

There was clearly some irony to all this. The Fed liked to maintain that interest-rate arbitrage was an inappropriate reason for a bank to borrow at the discount window; yet, the Fed's operating procedures would not work if banks ignored rate incentives. In any case, so long as banks' demand for loans at the discount window was predictable, the Fed could manage the funds rate quite neatly by calibrating the size of the banks' initial reserve deficit.

Pros and Cons of the Borrowed-Reserves Procedure

Since, under the old operating procedures, the level of borrowed reserves was used as a proxy for the funds rate, one might ask why the Fed didn't simply revert to a straightforward targeting of the funds rate. The answer probably lies in the same political factors that led the Fed to jettison a fed

funds target in the first place. Consider two alternative newspaper headlines, "Fed Raises Interest Rates" and "Fed Borrowing Targets Appear to Rise." Wall Street might have perceived the two statements to be equivalent, but Main Street wouldn't.

Also, under the borrowed-reserves procedure, the precise timing of a change in the Fed's borrowing target was difficult to pinpoint. There had always been a certain looseness, especially in the short run, in the relationship between the fed funds rate and borrowing at the window. Often it was difficult to tell whether a swing in the funds rate of $\frac{1}{8}\%$ or $\frac{1}{4}\%$ reflected a change in the Fed's stance or was simply a blip caused by a change in some exogenous factor. The Fed could of course have stated publicly what it was up to. However, at times, when it wanted to keep its political cover or to keep the market guessing, the Fed may have preferred continued ambiguity.

Fed officials offered other rationales for using the borrowed-reserves procedure. One was that the looseness in the relationship between the funds rate and borrowed reserves allowed market expectations to play a role in setting rate levels and that this in turn provided useful information to policy makers. No doubt, traders' expectations played a role, in the short run, in setting the funds rate, but it isn't clear that those expectations told the Fed anything useful. Traders know that the Fed dominates the funds market. Thus, to the extent that traders' expectations influence the funds rate, it is their expectations of future Fed policy that count. For instance, the market will knock the funds rate down if it thinks the Fed is on the verge of easing. In doing so, traders make no judgment as to whether economic conditions are such that the Fed should or shouldn't ease; they just bet that it will. As the Fed well knows, financial markets render traders' judgments about the appropriateness of macro policy in the rates yielded by longer-term securities, not in tightly controlled overnight rates.

The deliberate obscurity of the borrowed-reserves procedure had drawbacks at times. The period following the stock market crash in October 1987 is a case in point. At that time, when market uncertainty put a premium on clear central bank action, the Fed temporarily abandoned its borrowed-reserves target in favor of a policy that approached targeting the fed funds rate: it instructed the open market desk to bracket the funds rate in a narrow range without regard to the resulting impact on borrowing. Although the Fed never formally described its interim policy as rate pegging, it did admit that it was administering its reserve targets "flexibly" and with considerable importance attached to "money market conditions."

Quickly, the market recognized these qualifiers as code words for a policy of targeting the funds rate.

Breakdown of the Relationship of Borrowed Reserves to the Funds Rate

Once a sense of stability was restored to the market after the 1987 crash, the Fed tried to restore borrowed reserves as its central operating procedure. It succeeded only partially as the once-predictable link between borrowed reserves and the funds rate had, by then, become the latest victim of Goodhart's law. Once the Fed began to base policy on this relationship, the demand curve for borrowed reserves became unstable.

This problem is illustrated in Figure 9.2, which plots borrowings at the discount window against the average fed funds rate for each two-week reserve maintenance period from February 1984 through June 1989. Part A shows the maintenance periods prior to the 1987 crash; part B, the periods immediately after the crash. As the charts show, banks became, after the crash, much more reluctant to borrow at the discount window. In the first year and a half after the crash, banks rarely borrowed more than an average of \$600 million in any maintenance period despite the existence at times of extremely attractive rate spreads. In the precrash era, similar rate spreads had routinely led to borrowings of a billion or more.

The caution shown by banks meant that the Fed could no longer use the discount window to fine-tune market conditions. As part B of Figure 9.2 shows, an average level of \$600 million of borrowings was as likely to be associated with a 150-bp spread as with a 250-bp spread. Nudging bank borrowing became a blunt tool for controlling rates.

Consequently, the Fed began to focus more directly on the funds rate, which the open market desk can easily nudge up or down by being more or less generous in its day-to-day open market operations. Since the market knows that the Fed can exercise total control over the supply of nonborrowed reserves, it responds quickly to any hint that the Fed wants the funds rate to change.

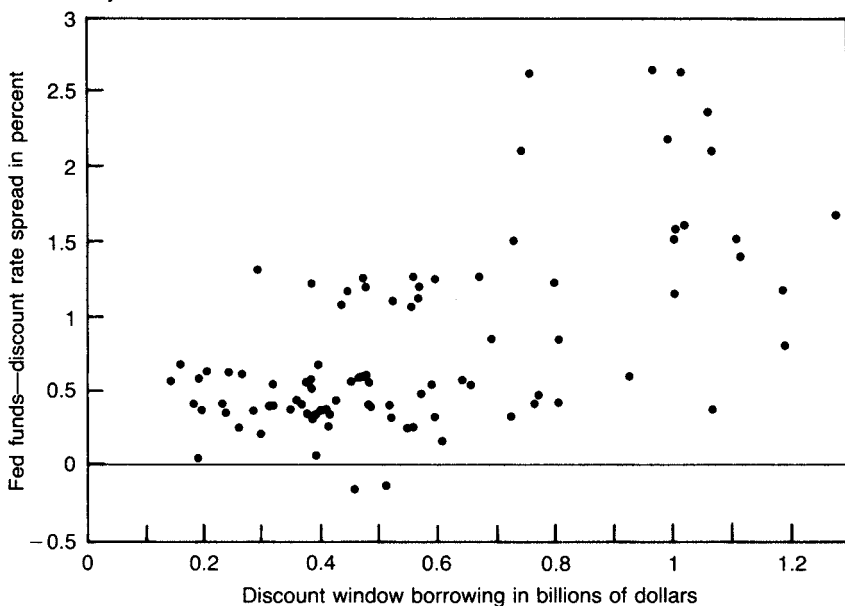
Funds Rate Targeting

By 1988 to 1989, one of the few differences that remained between a full-fledged, rate-pegging scheme and the shell of the prior borrowed-reserves procedure was that the Fed had set no explicit target for the funds rate as

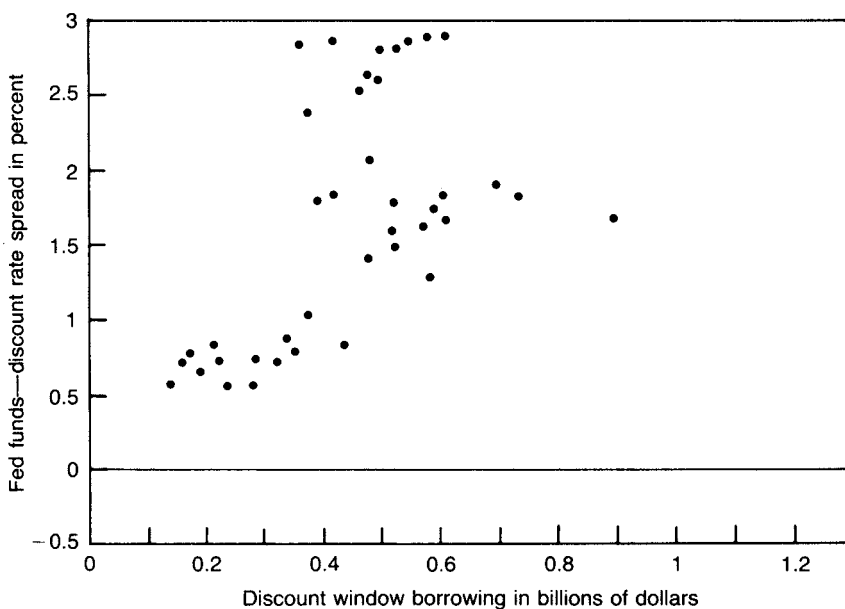
FIGURE 9.2

The shifting relationship between interest rates and discount window borrowing (reserve maintenance period averages)

A. February 1984–October 1987



B. November 1987–June 1989



Source: R. W. Wrightson & Associates, Inc.

was the case during the 1970s when the FOMC routinely specified a narrow (50- to 75-bp), short-run, target range for the funds rate. From 1979 to 1989, the only formal funds rate target the Fed published was the *consultation range* set at each FOMC meeting. Even though the FOMC clearly envisioned its policy moves in terms of discrete 25- to 50-bp rate moves, it never said so publicly and in fact did not begin to do so until July 1995.

The consultation range was a holdover from the Fed's monetarist era. When the FOMC all but abandoned its attempt to influence the funds rate in the short run, it built a safety clause into its operating directives to the desk: it specified a *very* wide band for the fed funds rate (typically 400 bp) with the proviso that the chairman should consult with FOMC members if the reserve targets seemed likely to drive the funds rate persistently out of that band. The consultation range was in fact breached several times during the chaotic monetarist experiment, but in today's environment the Fed is very effective at keeping the fed funds rate close to its target rate.

Today, it's unthinkable that the desk would allow the funds rate to swing by much more than 25 bp up or down without a specific FOMC instruction to do so.

The impact that a fund rate targeting regime has on reserves varies with the level of economic activity. When the demand for money is strong, reserves increase at a fast pace because the Fed must supply as many reserves as are necessary to keep the funds rate from rising above the target rate. During periods when the demand for money is slow, the Fed needs to supply relatively fewer reserves to the banking system to keep the funds rate at the target rate.

THE FED'S IMPACT ON THE BOND MARKET

Few factors move the bond market more than the Federal Reserve. The Federal Reserve's ability to alter short-term interest rates and the impact that this has on the bond market and the financial markets in general is immense. The Fed's impact on the bond market is particularly visible in the following:

- Nominal interest rates
- Real interest rates
- The yield curve
- The performance of spread products relative to Treasuries

Importantly, the effect of the Fed's monetary policies tends to affect each of the above with an uncanny degree of simultaneity, although not always, as is discussed later. Although no two financial episodes are alike, especially with respect to the magnitude of the reactions to the Fed's policy changes, the direction of change in market prices is generally predictable. For example, when the Federal Reserve raises interest rates, both nominal and real interest should be expected to rise; the yield curve should be expected to flatten; and spread products (corporate bonds, agencies, mortgage-backed securities, and the like) should be expected to underperform Treasuries, causing credit spreads to widen. These market responses to the Fed's policy actions generally help the Fed in attaining its policy objectives. Let's take a closer look at how the Fed spurs these market responses.

Nominal Interest Rates

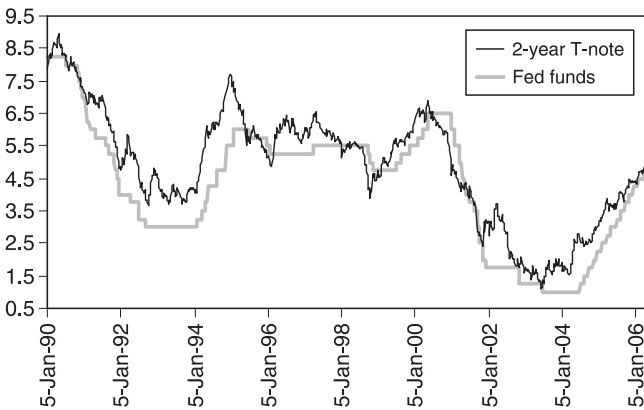
It's fairly easy to understand how the Fed's rate changes affect *nominal interest rates*. Nominal interest rates, of course, refer to the actual level of interest rates. When the Fed adjusts short-term interest rates, market interest rates adjust accordingly, particularly for money market instruments. There are several reasons for this. First, yields on short-term maturities are largely determined by the cost of money, which is principally determined by the federal funds rate, the interest rate the Fed controls. Figure 9.3 clearly shows the tight relationship that exists between the federal funds rate and short-term maturities. This tight relationship extends beyond short-term maturities, albeit to a somewhat lesser degree. It's important to note that nominal interest rates on short- and long-term bond yields rarely fall below the federal funds rate except in periods that precede imminent rate cuts by the Federal Reserve. Indeed, over the prior 16 years until 2006, the yield on the 2-year T-note fell below the federal funds rate on only five occasions. For the 10-year note, its yield dipped below the funds rate on only three occasions. On each occasion, the Fed lowered interest rates within just a few months. This clearly suggests that the federal funds rate is an important determinant of nominal interest rates.

Real Interest Rates

The Federal Reserve has a great deal of influence on the level of *real interest rates*, which is defined as nominal interest rates minus inflation.

FIGURE 9.3

Short-term Treasuries (2-year T-note) closely track the fed funds rate



Sources: Federal Reserve, Bloomberg

Real interest rates tend to rise when the Fed raises interest rates and fall when the Fed lowers interest rates. There are a few reasons for this. First, when the Fed embarks on a course to move interest rates either up or down, bond investors begin to anticipate additional interest-rate adjustments by pushing moving nominal interest rates either up or down more quickly than changes occur in the inflation rate. For example, when the Fed is in the midst of raising interest rates, it is presumably doing so because of an increase in perceived risks about inflation prospects. Bond investors recognize this and understand fully the Fed's historical tendency to push the federal funds rate up, often well above the inflation rate during periods when the inflation rate is either accelerating or at risk of doing so. Bond investors respond by pushing up real interest rates.

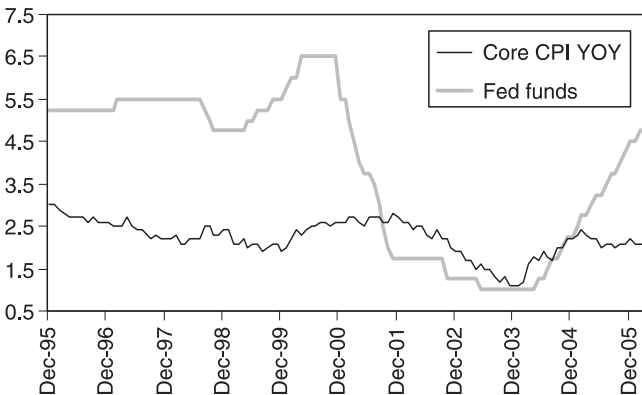
Second, the Fed endeavors to engineer either low real interest rates when the economy is weak or high real interest rates when the economy is strong. It does so in an attempt to achieve a certain degree of equilibrium between savings and investment in the economy. By varying the real interest rate, the Fed can have an enormous impact on savings and investment. For example, when the savings rate is high (as determined largely by the federal funds rate) and the investment rate is low (as determined by the inflation rate and the level of economic growth), an investor would

have a greater incentive to save rather than invest. A high real interest rate thus tends to dampen economic activity because it dampens the incentive to invest. Similarly, when the savings rate is low and the rate of return on investment is high, an investor would have an incentive to invest rather than save, thereby helping to spur economic growth. This is why during times of economic weakness it is critical for the Fed to move the federal funds rate (the savings rate) down as close to the inflation rate (the investment rate) as possible. This was the case in 2001 through 2003, when the Fed pushed the federal funds rate below the inflation rate. The Fed sought to stimulate investment by bringing the savings rate so low that the rate would serve as a powerful motivation to invest. The policy action helped to fend off threats of deflation, which grew following the bursting of the financial bubble in 2000. When the economy began to accelerate in 2004, the Fed began to remove its accommodation, thus reducing the incentive to invest rather than save. Figure 9.4 illustrates the behavior of real interest rates following the Fed's rate cuts in 2001.

The Fed's astute recognition in 2001 of the need to bring the savings rate below the investment rate stands in stark contrast to the policies adopted by the Bank of Japan in response to the chronic deflation in Japan that kept the investment rate below the savings rate for more than a decade, contributing to very weak economic conditions. Throughout the

FIGURE 9.4

Sometimes, negative real interest rates are necessary—fed funds rate versus core consumer price index



Sources: Bureau of Labor Statistics, Federal Reserve

1990s and the early 2000s, investors had little reason to invest in Japan's economy because deflation reduced the nominal value of investments there. The deflation in real assets such as real estate, for example, has been a powerful disincentive to invest in Japan. Investors would prefer to save their money at interest-rate levels barely higher than 0% rather than invest in real estate because the return on savings has exceeded the return that could be achieved on the real estate investment. It has therefore behooved the Bank of Japan to make every effort to reduce real interest rates as much as possible and to even consider bringing real interest rates into negative territory by raising the inflation rate (via monetarist actions and low short-term interest rates). This was a difficult task for sure, but it was an imperative following 15 years of recessions and meager economic growth. The Fed learned lessons from Japan, particularly with respect to the appropriate response to the bursting of a financial bubble.

A third way in which the Fed affects the level of real interest rates is through its credibility as an inflation fighter. When bond investors have confidence in the Fed, real interest rates tend to be low. This is because investors tend to demand less of an interest-rate premium over and above the inflation rate when they are confident inflation will be kept low. On the other hand, when investor confidence in the Fed's ability to fight inflation is low, bond investors will demand a higher real interest rate as compensation for the risk that the inflation rate will accelerate and thus erode the value of their bonds.

The Yield Curve

One of the biggest influences affecting the shape of the yield curve is the Federal Reserve. The Fed does this largely through its control of short-term interest rates. When the Federal Reserve either raises or lowers the federal funds rate, yields on short-term maturities tend to follow, as was seen earlier. As a result, the yield curve tends to steepen when the Fed lowers interest rates because yields on short-term maturities tend to fall faster than yields on long-term maturities. Yields on long-term maturities respond more slowly to the Fed's interest-rate moves because they are affected by a wide variety of other factors including speculative trading activity, technical factors, and inflation expectations. This brings us to our next point.

A second way in which the Fed affects the yield curve is by affecting inflation expectations, which have a large bearing on the behavior of

long-term interest rates, particularly compared to that of short-term interest rates. The Fed affects inflation expectations in two ways. First, when the Fed adjusts interest rates, the market's outlook on economic growth changes, thereby altering inflation expectations. Second, inflation expectations will either be higher or lower depending upon the Fed's inflation-fighting credibility. If investors are confident that the Fed will be able to contain inflation, this will tend to keep inflation expectations low, thus resulting in low long-term interest rates and a relatively flat yield curve. On the other hand, if the market lacks confidence in the Fed's ability to fight inflation, the yield curve will be steep, reflecting the market's uncertainty about the inflation outlook.

The yield curve is also affected by the bond market's expectations of future Fed policies. In theory, since long-term interest rates are thought to reflect expectations of future short-term interest rates, the yield curve therefore reflects expectations of future Fed rate actions. Thus, when the market expects the Fed to either raise or lower interest rates, long-term interest rates will tend to reflect these expectations, thus affecting the shape of the yield curve. There's one important point to remember in this regard. The degree to which the market embeds future Fed rate actions into long-term interest rates will depend a great deal upon the degree to which inflation expectations are well anchored. In other words, if inflation expectations are well anchored, then the amount of interest-rate adjustments the market will expect will tend to be smaller. For example, if the Fed begins to raise interest rates at a time when inflation expectations are either high or a bit fragile, then the rise in long-term interest rates is likely to be larger than it would be if inflation expectations were low. This is because the market will assume that a larger magnitude of rate increases will be needed to quash inflation. This type of response occurred in 1994, as is discussed a bit later. The impact of the Fed's rate actions on long-term interest rates is therefore very dependent upon inflation expectations. Thus, it can be said that the degree of leverage exerted by short-term rates over long-term rates is regime-dependent. In other words, the impact depends upon the market's perception of the amount of interest-rate adjustments needed to fight inflation. This can vary from one interest-rate cycle to the next but is largely related to the Fed's inflation-fighting credibility over a period of inflation episodes.

In 2004 and 2005, the Fed's inflation-fighting credibility likely played a role in the persistent flattening of the yield curve that occurred during the period. Bond investors, having assessed the long track record of

the Federal Reserve under the leadership of Fed Chairman Alan Greenspan, showed confidence in the Fed by driving long-term interest rates lower in the face of large increases in the federal funds rate. It's as if the bond market was saying to the Fed: "We trust that your actions will keep the inflation rate low." Such trust spilled over into the early days of Ben Bernanke's stay as Fed chairman, suggesting that investors felt the progress made on inflation during Greenspan's tenure had been institutionalized.

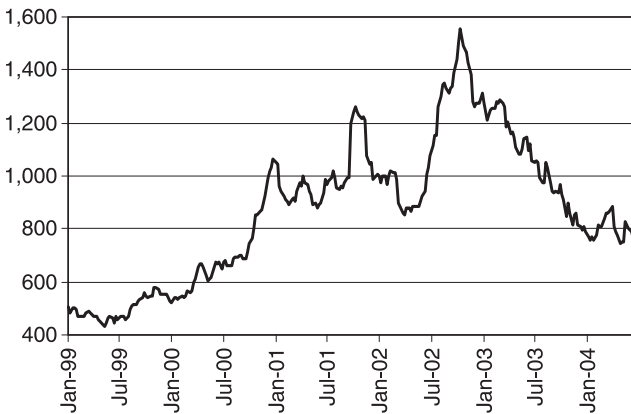
The Fed's Impact on Spread Products

The Federal Reserve can greatly influence the performance of *spread products*, or fixed-income securities other than Treasuries such as agency securities, corporate bonds, mortgage-backed securities, and emerging markets securities. These securities are called "spread" products because the yields on these securities are priced and quoted in terms of their yield *spread* over Treasuries. Since these spread products are deemed to be riskier than Treasuries, their yield spreads tend to fluctuate accordingly as perceptions about the risks of holding these securities change. These perceptions change especially when views about economic growth change. For example, during periods of economic weakness, the financial prospects for a wide variety of companies turn sour. Revenues decline, pricing power diminishes, and productivity declines, thereby putting downward pressure on profit margins and, in some cases, producing outright losses. Bonds in companies with low credit ratings hence come under pressure as investors worry about the ability of these companies to meet their payment obligations, which causes yield spreads on these securities to widen. Figure 9.5 clearly illustrates the impact that the economic weakness and subsequent expansion had on the credit spreads of low-grade bonds beginning in 2000. Investment-grade bonds are not immune to these same effects, but the impact is usually smaller.

The Fed affects credit spreads before its rate hikes affect the economy. For example, when the Fed raises interest rates, credit spreads tend to widen, because investors fear that the rate increases will weaken the economy. Similarly, when the Fed lowers interest rates, credit spreads tend to narrow in anticipation of a strengthening in economic activity. In early 2001, the Fed's series of interest-rate cuts initially had the usual effect of narrowing credit spreads, but the realization that economic conditions were worse than previously thought and the impact of September 11 caused credit spreads to widen again. Spreads then widened in 2002 when

FIGURE 9.5

The behavior of credit spreads during an economic cycle—S&P speculative-grade credit index



Sources: Standard & Poor's, Bloomberg

the economy rebounded less than expected. By October 2002, credit spreads began to narrow again, and they continued to narrow into 2005 in response to indications of strong economic growth before gradually increasing in 2006. The growth was strong enough to largely offset worries about the Fed's rate increases.

The clear pattern of the Fed's impact on credit spreads is a solid basis on which to formulate investment strategies for buying and selling spread products. Staying mindful of the notion that no two financial episodes are alike, spread products should be expected to outperform Treasuries when the Fed is lowering interest rates, and to underperform Treasuries when the Fed raises interest rates. Acting on these principles, an investor can tailor a fixed-income strategy around the Fed. Keep in mind, of course, that there can be sharp differences in the performance of the various spread products when interest rates fluctuate. For example, when interest rates fall sharply, mortgage-backed securities will tend to underperform other spread products, owing to worries that prepayments of the securities will rise as a result of high levels of mortgage refinancing and housing turnover.

TRANSMISSION EFFECTS OF MONETARY POLICY

When the Fed pulls on the interest-rate lever it affects more than just interest rates. Indeed, there's a multitude of ways the Fed's interest-rate changes are either amplified or offset via the capital markets and the banking system. These are known as *transmission effects*. There are five main ways in which the Fed's interest-rate adjustments are transmitted into the economy:

- Stock prices
- Government bond yields
- Corporate bond yields
- The value of the dollar
- Lending standards

The Fed's interest-rate changes are transmitted via these five market forces, which can significantly affect whether the Fed's actions have their intended effect. In other words, the greater the transmission effects, the more effective the Fed's rate actions will be and the less work that the Fed will need to do in order to achieve its objectives on economic growth and inflation. If, on the other hand, the transmission effects are either small or run counter to the intended effects of the Fed's actions, then the magnitude of rate adjustments needed to reach the Fed's objectives will likely be greater. In this case, market forces would be cannibalizing the Fed's actions.

So, the collective impact of the five transmission effects can have a very large bearing on the magnitude of interest-rate adjustments needed to solve a particular economic problem.

The conditions that describe the net effect of all the financial variables that affect the economic climate are known as *financial conditions*. Financial conditions are said to be loose, or accommodating, when they are conducive toward a strengthening of economic activity. Financial conditions are said to be tight when they are conducive toward a weakening of economic activity.

A classic example of two completely different ways in which transmission effects can affect the economy and the difficult task the Fed has in shaping the appropriate monetary policies occurred between 1999 and 2001. In June 1999, the Federal Reserve embarked on a campaign to raise interest rates in order to quell the rapid pace of economic growth and the

rampant pace of speculative fervor building up in the equity market (the Fed did not target the stock market per se, but the market's impact on economic growth). The Fed continued to raise interest rates for many months, and in early 2000 the Fed's actions began to work their way into the U.S. financial system, transmitting through a number of channels, causing financial conditions to tighten dramatically. Indeed, the technology bubble of 1999–2000 burst, sending technology stock prices sharply lower and inducing so-called negative wealth effects. This resulted in a weakening of consumer spending. In addition to the stock market decline, the yield spread between corporate bonds and Treasury bonds began to widen sharply, particularly the spread between low-grade corporate bonds and Treasuries. In response, credit became scarcer as lenders tightened lending standards and investors refrained from investing in all but the best and most creditworthy companies. This crimped the expansion of credit and thereby reduced the level of business investment. The Fed's rate increases also resulted in a strengthening of the U.S. dollar, which eventually reduced U.S. exports.

Combined, the transmission effects of the rate hikes that the Fed implemented in 1999 and 2000 likely went well beyond the Fed's intended effects. The result was a far greater weakening of the economy than the Fed probably expected.

The 1999–2000 episode demonstrates the enormous degree to which the Fed's interest-rate changes can be magnified by numerous other financial channels. It's also evidence of the very difficult task the Fed has in attempting to estimate the full impact of its interest-rate adjustments. One might say that *formulating the appropriate interest-rate adjustments is a bit like trying to walk a dog with a long leash*. The Fed thus has the unenviable task of providing a remedy to problems without knowing to what degree the patient will respond to the remedy. As with people, the required remedy and the intended effects can vary greatly.

On the opposite end of the spectrum, when the Fed sought to revive economic growth in 2001 it faced a very different set of circumstances when financial conditions tightened while the Fed was easing. As a result, the magnitude of interest-rate adjustments that were needed to cure the economy's ills became far greater than would probably have been necessary if the transmission effects had been more consistent with historical precedent.

The extraordinary episode began on January 3, 2001, when the Fed delivered its first of an unprecedented 11 interest-rate cuts that were

implemented that year. The typical response to such aggressive actions would normally entail a number of positive transmission effects, but the opposite actually occurred. Stock prices, for example, which normally rise when the Fed lowers interest rates, fell throughout the year with the decline briefly worsening in the aftermath of the September 11 tragedy. The weakness in stock prices contributed to a dampening of consumer confidence and consumer spending. In addition, the yield spread between low-grade corporate bonds and U.S. Treasuries stayed wide for most of the year, reaching its widest point exactly 10 months after the Fed's first rate cut of the year. The widening in credit spreads made borrowing costs prohibitive for many fringe borrowers and thereby reduced the aggregate level of borrowing and spending. That was also the opposite of what normally occurs when the Fed lowers interest rates.

Another uncharacteristic occurrence that followed the Fed's rate cuts was a rise in the value of the dollar. The dollar typically falls when interest rates fall because U.S. fixed-income assets become less attractive to foreign investors because of their lower relative yields. A declining dollar makes U.S. goods more affordable to foreign investors and therefore tends to lift U.S. exports, thereby stimulating the economy. In 2001, the rise in the value of the dollar hurt U.S. exports and thereby cannibalized some of the positive effects of the Fed's rate cuts.

Lending standards also remained tight through most of the year before easing up a notch at the end of the year, another uncharacteristic response to the Fed's interest-rate cuts. Commercial and industrial lending, for example, began to weaken sharply and did not begin to recover until 2003.

As a result of these uncharacteristic responses to the Fed's interest-rate reductions, financial conditions were actually tighter following the Fed's rate cuts than they were when the cuts began. The lack of positive transmission effects therefore necessitated a more aggressive series of rate cuts that eventually brought the federal funds rate down to 1.0% in June 2003, its lowest level in 40 years.

In 2005 and in early 2006, financial conditions again moved in the opposite direction of historical precedent. Although the Fed had begun raising interest rates in June 2004, financial conditions were actually looser a year later. Stock prices were up, bond yields were lower, credit spreads were tighter, the dollar was lower, and lending standards had eased. All these factors, being conducive toward a strengthening of economic activity, were offsetting the impact of the Fed's rate hikes, increasing the need for more rate hikes.

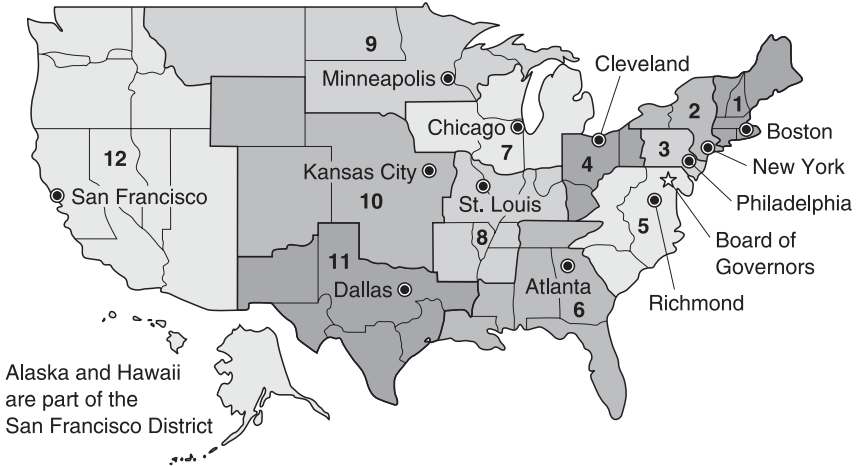
The important ways in which financial conditions affected the economy in 1999 and 2001 and then again in 2005 and early 2006 clearly illustrate the importance of assessing the transmission effects of monetary policy. It's simply not enough to surmise that interest-rate adjustments in and of themselves will succeed in bringing about a desired economic outcome. Moreover, it is important to recognize that the magnitude of interest-rate adjustments needed to reach a desired economic outcome can vary greatly from one economic cycle to the next depending upon a variety of factors and on the net change in financial conditions that follows the onset of the interest-rate adjustments. It's therefore critical to think outside the box and assess the net change in financial conditions as well as their potential impact on the economy rather than focus on the direct impact of the interest-rate adjustments alone.

Keeping these factors in mind can assist an investor in determining the amount of Fed rate adjustments that will likely be necessary for the Fed to reach a desired economic outcome. One's conclusion about this can help in judging the extent to which the market's expectations on rates and economic growth will be validated. Thus, if by analyzing the net transmission effects, an investor senses that the market's assumptions are unreasonable, then the investor will have a very strong basis for betting against market expectations. If an investor agrees with the market's assumptions, he will have a firm conviction for following market trends.

STRUCTURE OF THE FED

In order to accurately forecast changes in monetary policy, it's important to understand how the Fed is structured and how it goes about formulating its policies.

The Federal Reserve System was designed by Congress in a way that helps ensure that the Fed maintains a broad perspective on how the economy is faring in all parts of the nation. The Federal Reserve System was thus created with 12 regional Federal Reserve Banks located in major cities. Figure 9.6 shows a map of the 12 Federal Reserve districts. Reserve Banks perform a variety of functions that are similar to the services provided by regular banks and thrift institutions. For example, Reserve Banks hold the cash reserves of depository institutions and also make loans to them. The Banks also move currency in and out of circulation and process checks. The role of the Reserve Banks goes far beyond these relatively mundane tasks, of course, ranging from the actual printing of currency

FIGURE 9.6**The 12 Federal Reserve District Banks**

Source: Federal Reserve

and minting of coins to supervising and examining banks for safety and soundness. To Wall Street, the most prominent role of the Reserve Banks is the participation of the Reserve Bank presidents in the formulation of monetary policy. Wall Street watches the Reserve Bank presidents closely for clues on the direction of monetary policy. Each president is elected to a five-year term by the board of directors of the respective Reserve Banks. The terms of all 12 presidents run concurrently, ending on the last day of February of years ending in 6 and 1. The Reserve Bank presidents are part of the Federal Open Market Committee (FOMC), the committee that decides on interest rates.

Wall Street also pays close attention to the seven members of the Board of Governors who are appointed by the president of the United States and confirmed by the Senate for a term of 14 years. One term begins every two years on February 1 of even-numbered years. The chairman and the vice chairman of the board are named by the president from among the members and are confirmed by the Senate.

The FOMC is composed of five presidents of the Reserve Banks and the seven board of governors (including the chairman). The presidents of the Reserve Banks serve one-year terms on a rotating basis beginning January 1 of each year with the exception of the president of the Federal Reserve Bank

of New York who serves on a continuous basis. All the Reserve Bank presidents, even when they are not voting members, attend the FOMC meetings, participate in the discussions, and contribute to the assessment of the economy and of policy options. In other words, investors should listen to what they have to say, too.

Table 9.7 provides a reference of the various term lengths and appointments of important members of the Federal Reserve System.

DON'T FIGHT THE FED; FOLLOW IT

The adage “Don’t fight the Fed” is Wall Street lore. History is strewn with periods in which the performance of both the stock and bond markets was significantly influenced by Fed policy. Along the way, many investors have either profited from or been hammered by the impact of the Fed’s actions,

TABLE 9.7

Term lengths of Federal Reserve officials

Position	Term Length	Term Begins/Ends	Appointed by
Reserve Bank president	5 years	Terms end on the last day of February in years ending in 1 or 6	Board of directors of each of the respective 12 Reserve Banks
Governor	14 years	Term dates vary, but one ends every two years on February 1 of even-numbered years	The president of the United States appoints; the U.S. Senate confirms
Vice chairman	4 years	Dates vary	The president of the United States appoints from existing Board members or names a new member; the U.S. Senate confirms
Chairman	4 years	Dates vary	The president of the United States appoints from existing Board members or names a new member; the U.S. Senate confirms

Source: Federal Reserve

depending upon the degree to which they showed respect for the Fed's ability to affect their investments.

Despite the unmistakable impact that the Fed has had on the markets over the years, investors have not always paid heed to the power of the Fed. Instead, they have gotten caught in bouts of excessive optimism and pessimism, often finding it difficult to see past their own emotions. But investors almost always seem to come around at some point, eventually recognizing that the Fed's handiwork will have its intended effect.

A great way to see the very large impact that the Fed can have on the markets is to look at the bond market's response to policy speeches delivered during the tenure of Federal Reserve Chairman Alan Greenspan. Twice per year the Fed chairman delivered testimony to Congress in a report simply called the "Monetary Policy Report to Congress"—formerly known as the Humphrey-Hawkins testimony until the Humphrey-Hawkins Act of 1978 was altered in July 2000. These testimonies, which are mandated by law, require that the Fed give its view on both monetary policy and the economy to both houses of Congress. In the House, the chairman delivers testimony to the Committee on Financial Services; in the Senate, the chairman delivers testimony to the Committee on Banking, Housing and Urban Affairs. The testimonies are usually delivered in February and July. The reason that these testimonies are so revealing is that the detail in which Greenspan described the Fed's sentiments almost always pushed him into sensitive topics, thus spurring a sharp response in the bond market. Table 9.8 illustrates these reactions by highlighting the sharp reactions seen on the days Greenspan delivered his semiannual reports.

As Table 9.8 shows, sharp reactions generally followed Greenspan's initial testimony (before either the House or the Senate). The table shows that the most actively traded Treasury bond futures contract averaged an absolute change of $\frac{3}{32}$ on the first day of Greenspan's testimony. That is a big move for one day—the average daily change in T-bond futures is roughly $\frac{1}{32}$. Eurodollar contracts, which are basically a reflection of the federal funds rate, have also moved sharply relative to their daily average.

That there have been sharp reactions should not be too surprising. But what stands out, and what is perhaps more important for investors to remember, is the follow-through to these reactions; during the periods shown in Table 9.8, in the week that followed Greenspan's testimony the cumulative reaction has been usually double that of the initial reaction. And it goes on: one month later the reaction nearly doubles again (also in the same direction as the initial reaction), as the realization of the Fed's

TABLE 9.8

Historical reactions to Greenspan's semiannual monetary policy reports to Congress (changes in 32nds of a point for the front-month T-bond future)

Year	February	July
1993	+7	-5
1994	+14	-31
1995	+30	-58
1996	-68	+43
1997	-55	+40
1998	-29	+18
1999	-29	-34
2000	+15	+50
2001	-6	+31
2002	+27	-34
2003	-2	+71
2004	+29	-32
2005	-19	+15

policy stance sets in and market participants continue to adjust their positions accordingly. Remembering this the next time the Fed chairman delivers one of these speeches seems like a worthwhile exercise for investors (investors should read his entire speech; they shouldn't just listen to sound bites). If, for instance, in the aftermath of the report to Congress, the market trades sharply higher or lower, investors could consider placing a trade in the same direction of that reaction and wait for there to be follow-through in the market. Investors should give it at least one week to work and then reassess, but they should keep in mind that the market response to Greenspan's policy speeches usually lasted at least several weeks.

Ostensibly, the market reacted so sharply to Greenspan's semiannual reports to Congress because it believed that what it heard from him was an unmistakable reflection of Fed policy. And since Fed policy doesn't change on a dime, the market found cause to continue the response for several more weeks. Indeed, the Fed generally maintains its monetary policies for many months, sometimes years at a time. The lesson for investors is to identify the Fed's monetary policy stance and formulate

Federal Reserve Chairmen Since 1933

Eugene R. Black	May 19, 1933–August 15, 1934
Marriner S. Eccles	November 15, 1934–January 31, 1948
Thomas B. McCabe	April 15, 1948–March 31, 1951
Wm. McChesney Martin, Jr.	April 2, 1951–January 31, 1970
Arthur Burns	February 1, 1970–January 31, 1978
G. William Miller	March 8, 1978–August 6, 1979
Paul A. Volcker	August 6, 1979–August 11, 1987
Alan Greenspan	August 11, 1979–January 31, 2006
Ben Bernanke	February 1, 2006–

investment strategies in ways that are consistent with the Fed's stance. Moreover, investors could seize the short- and long-term trading opportunities that arise when the Fed chairman delivers a policy speech by establishing trading positions that anticipate a sustained market response to the speech. Long-term investors can use these principles to help with the timing of their entries into and exits from their portfolio positions. Investors should use these principles in their consideration of directional bets and bets on the relative performance of the various segments of the bond market. These principles can also be used to assess the outlook for investment returns in bonds compared to other financial assets.

Trust the Fed

Greenspan's tenure as chairman of the Federal Reserve is littered with episodes in which he appeared either as friend or foe to investors. He was often criticized and singled out when the Fed raised interest rates. For example, investors wondered why the Fed raised interest rates at all during the 1990s when good times were rolling. Others say the Fed didn't do enough given that a financial bubble was building.

However, in the same way that parents must discipline their children, the Fed's duty is also to act as disciplinarian—of the U.S. economy, that is. Just as it would be unfair to pass judgment on the disciplinary actions of parents, who deploy their discipline with the good of their children in mind, it is also unfair to criticize the Fed's "disciplinary" actions. Importantly, the Fed, like a parent, has always demonstrated that, when the chips are down,

it is there for us every step of the way. It's the Fed duty to take the proverbial punch bowl away before the party gets out of hand.

A Classic Case of the Fed's Tough Love

A classic example of the Fed's tough love took place in 1994. During that year the economy seemed to be rolling along just fine, but the Fed felt that it was growing too strongly and that it could accelerate inflation. In response, the Fed implemented a series of interest-rate increases, raising the federal funds rate six times in 1994 and once more in early 1995. Many investors were dismayed by the interest-rate increases, and it looked as if the Fed might derail the nascent expansion. The Fed's tight grip resulted in a subdued year for the stock market and a wretched one for the bond market. In fact, 1994 was the worst year for the bond market in decades. The yield on the 30-year Treasury bond rose from a low of 5.78% on October 15, 1993, to a peak of 8.16% on November 7, 1994. The poor performance of the bond market spilled over into the stock market where the S&P 500 fell by 1.5% in 1994.

As bad as the interest-rate increases seemed, the Fed had good intentions: the inflation rate looked set to rise in a way that could undermine the economic expansion. The inflation rate was kept at bay because of the Fed's actions. In 1994, there were many more people who worried about inflation than there are today. Late 1990s expressions such as "the new era economy," and the "Goldilocks economy," were themes that very few investors harbored at that time (these themes hold that the economy can grow strongly without inflation because of conditions that are "just right" thanks to productivity gains, for the most part). In 1994, most investors still believed in the more traditional view that strong economic growth leads to inflation. After all, just a few years earlier in 1990 the consumer price index got as high as 6.3%. That's why, when economic growth strengthened at the end of 1993 and into early 1994 after several years of sluggish growth, inflation expectations immediately began to rise.

The Fed's challenge in 1994, therefore, was to convince investors that the inflation threat would be quashed. Mind you, given the economic backdrop, the inflation threat that existed was mostly psychological: the unemployment rate was relatively high at 6.6%; savings and loans institutions were still recovering from a crisis that began several years earlier; worker insecurity was soaring in response to a spate of huge corporate layoffs; businesses were starting to invest heavily in new technology that

would dampen inflation pressures by increasing productivity; the budget deficit was falling; and the global economy—led by Japan—was weak. In hindsight, it is striking to think that despite all these factors, inflation fears were strong enough to push the yield on the 30-year bond to over 8%. It hasn't even come close to that in recent years, averaging about 4.95% over the five years ending in September 2006.

When the Fed began its fight against inflation, it was fighting fears that were not its own. As Federal Reserve Chairman Alan Greenspan once said, price stability exists only when “the expected rate of change of the general level of prices ceases to be a factor in individual and business decision-making.” Other Fed officials have expressed similar thoughts. Thus, even though the 1994 inflation threat did not appear to be as great as investors feared, it nonetheless was affecting the way individuals and investors behaved. The Fed, therefore, had to convince the public there was no inflation threat and that inflation was a thing of the past.

Because the Fed didn't fully know the extent to which inflation fears might grow, it began its battle against inflation worries by raising interest rates slowly, beginning in February 1994 with three consecutive 25 basis point increases in the federal funds rate. But as the extent of the inflation fears became evident in both the behavior of commodity prices and long-term interest rates (both were rising sharply, indicating inflation fears), the Fed knew it had to do more in order to reassure investors that inflation would not return. The Fed then opted for larger rate increases of 50 basis point increments in both May and August of 1994. But in November of 1994, when it appeared that its new strategy was failing to calm inflation-wary investors, the Fed asserted itself with a large rate hike of 75 basis points. One might think that this would deal the markets a decisive blow and push market interest rates sharply higher, but the opposite occurred. Bond yields peaked that month and began a steady decline that lasted throughout the next year, even though the Fed would deliver another rate hike—of 50 basis points—three months later in February 1995.

The Fed had finally conquered investors' inflation fears and the economic imbalances that created them. The payoff from its efforts quickly followed; in 1995 long-term government bonds returned over 30%, and the S&P 500 returned 34.1%. Inflation rose by just 2.6%, and there was nary an inflation fear for the next decade. That year marked the beginning of several years of almost unparalleled prosperity that benefited millions of Americans.

The 1994–1995 episode is one of the best illustrations of how Greenspan and the Fed gave the appearance of being the market's nemesis

only to prove that they were the market's best friend. The episode is a clear illustration of the importance of trusting the Fed, especially if there is a steward at the helm who is as strong and effective as Alan Greenspan was. The Fed's mandate, after all, is to conduct its policies in a way that is consistent with the pursuit of full employment and stable prices.

Therefore, when market participants appear to have little faith in the Fed, perhaps it is best to capitalize on what might be wrongheaded conclusions about the Fed's ability to implement policies that will ultimately prove beneficial for both the economy and the markets. Countertrend trades are therefore likely to be successful in this instance, although caution must always be injected when betting against the collective opinions of the market.

THE ART OF FED WATCHING

Earlier we saw how the bond market reacted very sharply to the semiannual reports delivered to Congress by Federal Reserve Chairman Alan Greenspan during his tenure and how the reactions to his testimonies tended to be long-lasting. Predicting the market's behavior during months in which the Fed chairman delivers testimony is therefore simpler than in other months, thanks to the large extent to which the Fed chairman is forced to delve into sensitive topics. During the rest of the year, however, the specificity of both the chairman's remarks and those of his Fed colleagues is not nearly as sharp. It therefore becomes necessary to pick up signals from the Fed through other means, and this requires a bit more, shall we say, inspection. One must become an avid Fed watcher if he is to predict what the Fed will do next. Try to think about Fed watching this way: let's say that you've been asked to solve a mystery in which all the principal players are known; they talk in public all the time; you get a plethora of clues about what they're thinking; they give you verbatim transcripts of what they say in private; and they give you the minutes of all of their meetings. No doubt you'll be able to crack that mystery in a jiffy. This is exactly how it is with the Fed, so there's absolutely no reason to be intimidated.

As stated earlier, Fed watching begins with recognizing that when the Fed chairman delivers a policy speech, the impact is often long-lasting. With this in mind, investors should tailor their trading strategies accordingly, working on the assumption that the policy speeches delivered by the Fed chairman are a true reflection of the Fed's current stance on monetary policy and that the markets will behave in a way that is consistent with that policy stance.

While the Fed chairman can be relied upon to occasionally give guidance on Fed policy, investors must find ways to decipher policy on a regular basis. The best way to do this is to follow the Fed members regularly and closely. What one needs to do is to get in the Fed's shadow, so to speak, by tracking the verbiage spewed by the Federal Open Market Committee (FOMC)—the cast of 13, including the Fed chairman, given the privilege of voting at FOMC meetings. There are five additional Federal Reserve officials who attend the Fed's meetings, alternating the privilege to vote every other year. Although they do not vote, the alternates are proverbial flies on the wall at the FOMC meetings. While their presence at the meetings raises the importance of what they have to say, investors are best advised to focus more on the comments delivered by the 13 voting members.

Useful to Fed watchers are the minutes of the FOMC meetings, which are now released three weeks following the meetings instead of the six-week span that prevailed before the release date was changed in 2005. The Fed changed the release date as part of its efforts to improve its transparency. The minutes give Fed watchers greater details about what the FOMC members discussed behind closed doors. In particular, the degree of support shown by Fed members for the Fed's announced policy decisions helps in uncovering potential shifts in the Fed's policy stance. The minutes are also useful in predicting changes to the Fed's policy statements, which are delivered following the conclusion of the FOMC meetings.

Read the Fed's Speeches

One of the best ways to follow the Fed requires a little bit of homework. However, the payoff can be huge, and it actually takes very little time. Specifically, reading the text of the Fed's speeches can give a Fed watcher a solid grasp of where the Fed stands on monetary policy. Many top investors make the Fed's speeches must reading, and it puts them ahead of others in terms of understanding Fed policy and the likely direction of interest rates. The speeches are readily available on the Fed's Web site at www.federalreserve.gov or on the Web sites for the Reserve Banks, particularly for the presidents of the Fed's 12 Reserve Banks.

It is really not all that laborious to do this work because most of the Fed's speeches are generally just a few pages long. The speeches give investors far greater insight into the Fed than can be discerned from newswire headlines, which can often reflect a reporter's subjective view about the speeches and are thus open to misinterpretation. No investor

should rely upon reporters to tell him what he should be thinking about what the Fed said; it is really up to each investor. It is perilous to leave the analysis of the Fed's speeches in the hands of reporters in print, broadcast, and the electronic media, who sometimes have very little background on the financial markets and, quite frankly, can at times be novices when it comes to analyzing the Fed in the way that is required of an investor, particularly an institutional investor.

Watch the Fed's Phraseology

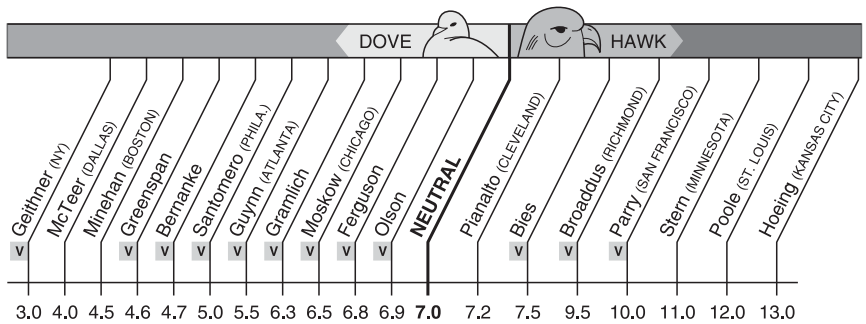
What should an investor look for when reading the Fed's speeches? Look for key phrases that are repeated in lockstep by several Fed members. When one sees a few members collectively repeating a particular phrase either verbatim or nearly so, one can sense that the phrase might be a representation of current Fed policy. When Fed members sing the same tune, envision them meeting with each other—either in person or by telephone conference and drawing conclusions about where they stand on policy and on how they should weave their policy sentiments into their public comments.

Of course, each Fed member has his or her own personal view on Fed policy and the economy, and they are free to express such views. Wall Street divides the Fed's members into two main camps: hawks and doves. Hawks are members who appear wary about the inflation outlook. They therefore tend to express an inclination to raise interest rates when inflation pressures appear to surface or when economic growth is strong. Doves, on the other hand, tend to be more sanguine about the inflation outlook and generally worry less about the implications of strong economic growth than the hawks do. Wall Street often measures the degree to which the members are either hawkish or dovish by using a hawk/dove scale like the one shown in Figure 9.7.

You might think that hearing a wide range of views from the Fed might make the task of interpreting where the Fed stands on policy more difficult, but these personal opinions actually help to shed insight on Fed policy. How? Basically, if there's consistency in the use of phraseology by members known to have views that are polar opposites on monetary policy (similar to the way that democrats and republicans differ on many issues), then their joint use of a particular phrase is generally a strong indication of agreement over where the Fed stands on a particular issue. The differing views among the Fed's members can help investors put the individual views expressed by the members into context, similar to the way in which

FIGURE 9.7

Hawk/dove scale



Note: V indicates voting member in 2004.

Source: Bondtalk.com

knowing whether a politician is a republican or a democrat helps to put his or her comments in the proper context.

In 1999, for example, just before the Fed began raising interest rates in June of that year, several Fed members repeatedly used the phrase, “The balance of risks has shifted (toward higher inflation).” Some of the Fed members who repeated this phrase were not prone to saying so, given their personal views. Their common use of this phrase therefore suggested that the Fed was in the midst of formulating a new policy designed to counter the risks its members were referring to. Indeed, a hike in interest rates soon followed. Similar phraseology was used at the opposite end of the spectrum at the end of 2000, indicating that interest-rate reductions were in the offing, as indeed they were.

It is always striking to think that by simply following the words of a handful of people at the Fed, an investor can gain insights that give the investor an edge over millions of other investors. That is why the Fed’s speeches should be considered required reading.

The Yield Curve as a Predictor of Fed Rate Changes

One predictor of interest rates that many Street people look at is the yield curve. The argument for the yield curve as a predictor of interest rates is best illustrated with an example, from October 2005 when the slope of the yield

curve was *positive*. At that time, the 3-month bill was trading at 3.62; the 6-month bill at 4.00. Presumably, many people holding the 3-month bill had longer-term money to invest and could therefore have bought the 6-month bill, which was yielding 38 bp more than the 3-month bill. For them not to have done so implies that they expected that the 3-month bill three months hence would yield 4.38, that is, that by rolling the 3-month bill, they could earn the same *average* return over six months as they could by buying the 6-month bill. This sort of argument can be applied to any stretch of the yield curve, so that, throughout its length, the shape of this curve reflects the Street's expectations concerning what future interest rates will be and thus provides implicit consensus predictions of future rates.

Regardless of whether the yield curve is a good or bad predictor of interest rates, an investor can't ignore the implicit rate predictions made by it. In the situation we describe, an investor who bought the 3-month bill when he had 6-month money to invest *bet* implicitly that the 3-month bill three months hence would yield at least 4.38. He should know that that's his bet, ask whether it's a good bet, and not make the bet thoughtlessly.

At times, such as in early 2000, the slope of the yield curve in the bill market is *negative*: an investor must give up yield to extend maturity. Such a yield curve indicates that investors expect rates to fall and are betting on this by buying relatively expensive, longer-dated bills.

It's amusing, perhaps revealing, to note that in a freedom of information suit many years ago, the Fed was forced to make public an internal memo that showed that the yield curve had had a better track record at predicting interest rates than did the Fed's own model. From this, one might conclude that econometric models are abysmal at predicting interest rates, that the yield curve is a better predictor of interest rates than most people believe, or that interest rates can't be predicted!

REVIEW IN BRIEF

- The Fed was created largely to conduct the nation's monetary policies by influencing the money and credit conditions in the pursuit of full employment and stable prices. The Fed's main tool in this regard is its ability to set interest rates via its open market operations.
- Political pressure on the Fed has been more fiction than fact over the past two decades, as evidenced by the Fed's policy decisions during election years.

- There are many variables that the Fed must consider when adjusting the level of reserves in the banking system to conform to a specific interest-rate target for the federal funds rate.
- In January 2003, the Federal Reserve revamped its rules surrounding borrowing from its *discount window*, which is a facility that allows banks to borrow from the Fed. Many factors, including the 2003 regulations, have substantially reduced the amount of borrowing from the discount window.
- One of the tools available to the Fed, but which is rarely used as such, is its ability to alter *reserve requirements*. Reserve requirements refer to the amount of money banks are required to keep in reserve against their existing capital.
- Even though at the end of the 1980s the FOMC clearly envisioned its policy moves in terms of discrete 25- to 50-bp rate moves, it never said so publicly and in fact did not begin to do so until July 1995.
- The Fed's rate decisions have a significant impact on the bond market, affecting nominal rates, real rates, the yield curve, and spread products.
- Monetary policy is "transmitted" via the financial markets and the banking system. The need for monetary tightening or accommodation can be affected considerably depending upon the extent to which the Fed's policy actions are transmitted.
- The Fed is structured in a way that gives it a broad view of the economy. At the Fed's eight meetings per year, members debate the need for interest-rate adjustments, with the Fed chairman holding the most sway.
- The adage "Don't fight the Fed!" emanates from the cumulative experiences of millions of investors over many decades. History has proven that investors who put their faith in the Fed are likely to achieve much higher investment returns than those who ignore the Fed.
- An investor can improve his or her ability to anticipate the Fed's rate actions by becoming an avid Fed watcher. Doing simple things such as reading the Fed's speeches and watching for the repetition of key phrases can go a long way toward giving an investor an edge over other investors.

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The Market Makers: Dealers and Others

The collection of markets described in this book is called *the* money market. This suggests that the market's participants trade in a single market where at any time one price reigns for any one instrument. This description is accurate, but startling. Money market instruments, with the exception of futures contracts, are traded not on organized exchanges but over the counter. Moreover, money market participants, who vary in size from small to gargantuan, are scattered over the whole United States—and throughout Canada, Europe, Latin America, the Middle East, and the Far East. Thus, one might expect fragmentation of the market, with big New York participants dealing in a noticeably different market from their London or Wichita counterparts. However, money market lenders and borrowers can operate almost as well out of Dearborn, Michigan (Ford), Washington, D.C. (the World Bank), Tokyo, or Singapore as they can from Wall Street. Wherever they are, their access to information, bids, and offers is (time zone problems excepted) essentially the same. That the money market is a single market is the result largely of the activities of the dealers and brokers who weld the market's many participants into a unified whole and to many new forms of communication, which make this possible.

THE DEALERS

First, a few definitions. In the United States, commercial banks, prior to the slow but eventual repeal of Glass-Steagall in 1999, were institutions

whose mission, according to law and regulation, was to accept deposits in one form or another, to make loans, and if they so chose, to trade exempt securities. In their native countries, foreign banks often have broader powers; Japan is an exception, as it acquired, thanks to the American occupation after World War II, its own version of Glass-Steagall.

Nonbank dealers fall into the category of *investment bankers*. An investment banking firm is permitted to trade and to underwrite both exempt securities and corporate stocks and bonds as well—any paper that it or others can devise and bring to market. Investment banking, like commercial banking, requires a lot of capital. Among firms in the business, there are huge differences in size, capital, and range of products covered.

The repeal of Glass-Steagall, which occurred in November 1999 via the *Gramm-Leach-Bliley Act*, permits banks to enter the arena so long as they become *financial holding companies* (FHCs) first, but they have been slow to do so; although the number of FHCs grew from 95 in March 2000 to 466 by the end of 2004, FHCs have not increased as a percentage of all banking organizations.¹ More precisely, the Gramm-Leach-Bliley Act permits banks, securities firms, and insurance companies to affiliate within a new financing holding company.

The British have *merchant banks* whose principal mission is to earn fees by playing an advisory role and by setting up deals—often with an investment of their capital in the equity of the deals. To add to the confusion, all the above institutions play a lot or a little on each other's turf. Also, the British have a confusing habit of referring to investment bankers as “banks,” so when a Brit talks about a bank, it may turn out to be Merrill Lynch.

This is a book about the money market. Consequently, in speaking of *dealers*, our principal focus is on the activities of investment banks and of commercial banks in the issuance and trading of money market securities. However, we can't ignore the many other markets in which some dealers are active because how well or poorly dealers fare in these markets can and has affected their money market activities; for example, traders at firms that were affected by the events surrounding Russia's default on its debt in 1998, as well as other events such as the bursting of the stock

¹ Ellen Harshman, Fred C. Yeager, and Timothy J. Yeager, “The Door Is Open, but Banks Are Slow to Enter Insurance and Investment Arenas,” *The Regional Economist*, Federal Reserve Bank of St. Louis, October 2005.

market bubble in 2000, were in no mood or position to be active market makers and position takers in Treasuries, money markets, or mortgage-backed securities.

Agent and Principal Roles

In dealing in money market paper, dealers may wear one of two hats, agent or principal. If a dealer acts as an *agent*, it gets a *fee* from an issuer for showing and selling the issuer's paper to investors. Goldman, Merrill, and Lehman, all big dealers in commercial paper, wear their agent hat almost all the time when they sell commercial paper. So too do dealers when they sell new medium-term notes (MTNs) for issuers. We say "almost all the time" because occasionally an issuer, with a special financing need, will ask a dealer, who is its agent for selling commercial paper or MTNs, to position for it a specific chunk of paper to a specific date—always with the understanding that that paper is the dealer's to trade as it chooses.

When a dealer puts on its hat as *principal*, that means the dealer is buying for and selling from its own position; put another way, in a trade, the dealer is the customer's counterparty, not its agent. Dealers act as principals in many sectors of the money market. For example, when dealers bid on, distribute at issue, and later trade Treasury and federal agency securities, they always act as principals. When dealers act as principals, it does not necessarily mean that they are taking a proprietary position; rather, the positions they acquire often reflect market-making activities and the market conditions that force dealers to hold positions.

To say that a dealer acts as an agent in a particular market does not preclude it from also trading in that market as a principal. For example, dealers can act as agents, most times, when new paper is issued; but equally important, they act as principals in creating a lively secondary market for such paper.

Dealers as Market Makers

While their motive is profit, the crucial role dealers play in the money market is as market makers; and in performing that role, they often trade off their own positions. Part of the dealers' role as market makers involves *underwriting new issues*. Most large municipal note issues are bought up at issue by dealers or syndicates of them who take these securities into position and sell them off to retail. In the market for governments, there is

also underwriting, though of a less formal nature; frequently, dealers buy large amounts of new government issues at auction and then distribute them to retail.

In the *secondary market*, dealers act as market makers by constantly quoting bids and offers at which they are willing to buy and sell. Some of these quotes are to other dealers. In many sectors of the money market, there is an *inside market* among dealers. In this market, dealers quote price *runs* (*bids* and *offers* for securities of different maturities) to other dealers, often via interdealer brokers. Since every dealer will *hit* a bid it views as high and *lift* an offering it views as low, trading in the inside market creates, at any time for every security traded, a prevailing price that represents the dealers' consensus of what that security is worth.

Dealers also actively quote bids and offers to retail. In doing so, they consistently seek to give their customers the best quotes possible because they value retail business and know that other shops compete actively with them for it. This competition ensures that dealers' quotes to retail will never be far removed from prices prevailing in the inside market. Thus, all the money market's geographically dispersed participants can always trade at close to identical bids and offers.

As the above suggests, through their trading activities, the dealers give the secondary market for money market instruments two important characteristics. First, they ensure that at any moment a single price level will prevail for any instrument traded in it. Second, by standing ready to quote firm bids and offers at which they will trade, they render money market instruments liquid.

SOURCES OF DEALER PROFITS

Dealers earn profits from various, often interrelated, activities: agent fees, trading, doing customer business, positioning, carry (when it's positive), arbitrage, the sale of proprietary products, clearing, investment advisory services, financing services, securities lending, and so on. These can be divided into three categories: investment banking, agency and principal transactions, and asset management and securities services.

Agent Fees

Currently, commercial paper outstanding dwarfs the amounts outstanding for every other money market instrument and it even outstrips T-bills

outstanding by roughly double. Also, the MTN market and the mortgage-backed securities market have been, for money market dealers, the big success stories of the past two decades. Thus, agent fees, for dealers who are top players in the commercial paper, MTN, and mortgage-backed securities markets, amount in the aggregate to a tidy and dependable source of profit. Also, those fees are a profit source that commercial bankers have eyed with envy as they fought to break down barriers that prevented them from expanding further into investment banking.

Trading and Principal Investments

What a trader is supposed to do depends on what she trades and what firm she works for; it also depends on market environment. In the past, traders were often expected to make money by actively trading their sector of the market, short term, even intraday, and often interdealer. Bouts of historically high and historically volatile interest rates as well as major losses at a number of houses in the 1980s caused firms to put more focus on building up dependable, steady sources of profit and on controlling risk. Much has changed since then. Today, short-term trading of cash instruments to earn trading profits is an important source of dealer profits. At Goldman, for example, about two-thirds of the roughly \$25 billion of net revenues the company earned in 2005 were from trading and principal investments.

Some years ago, a trader described the Street as “the last frontier.” In a sense, it still is for the right person in the right place. However, dealers, unlike Clint Eastwood, are not eternally primed to shoot from the hip whenever an opportunity arises. Dealers go through cyclical mood swings that are heavily dependent both on their past results and on the current market environment.

Still, over time, dealing rooms have become populated by ever more traders. There has been a proliferation of products; a dealer probably has fewer, perhaps far fewer, traders now trading strictly money market instruments. But it now has basis traders trading the basis between various cash and futures instruments, options adjusted traders who arb OTC options against Treasuries if yield on these looks relatively cheap or rich, swap traders, and all sorts of other arb traders. In addition there are traders in other sorts of derivatives products, many of which trade using quantitative models and such. With the advent of globalization and 24-hour markets, there are more and more instruments to arb and more and more hours in which to do it. Thus, it is not surprising that the primary dealers

have a large staff of traders—many of whom have offices not only in New York, but in London, Tokyo, and Hong Kong; and this list is far from all-inclusive.

Servicing Customers

An important part of a trader's job has always been to service her firm's retail base: to acquire, at attractive rates, paper for her firm's sales force to show and sell to investors. Sometimes, that is most or all of what a firm wants certain traders to do. For example, Merrill, with its superb distribution, wants its money market traders to concentrate on acquiring paper for distribution; they are not paid primarily to make a couple of 32nds here or there trading.

In governments, a dealer also tries to make a 32nd by buying in the *inside*, interdealer market and then selling to retail. However, competition to capture big retail accounts is often so fierce that such profits prove illusive. Nonetheless, dealers keep competing to do retail business because, even if it's not particularly profitable, it gives them valuable information on how customers view the market, on what they are doing—buying or selling.

“One of the most important factors in our positioning,” noted one dealer, “is what our customer base is doing. If we see a tremendous amount of customer selling, we will do the business, but our traders must be adept at buying securities and immediately dumping them back into the Street through the brokers and ending up, ideally, short the market. That information [on customers] is really valuable; it is why we develop those relationships.”

In recent years, the profits that dealers earned by servicing their clients would not have been possible if not for their market-making activities. In other words, some of the revenues that dealers earned occurred solely because they took positions that facilitated their client's transactions. Here, there is a big difference between principal trades, which dealers take on in order to facilitate their clients, and proprietary trades, which are used for speculation.

Proprietary Products

When the glamour of doing big deals in governments, corporates, agency paper, or money markets is stripped away, running a dealership is not so different from running a supermarket: a dealer's competitors all have

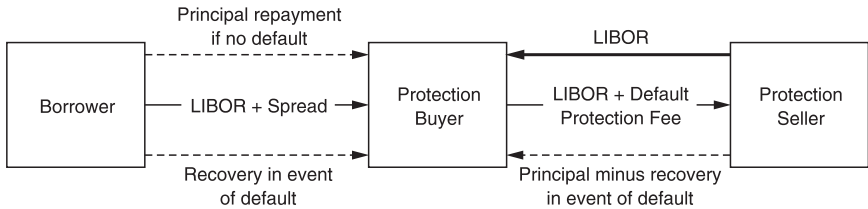
pretty much the same products at pretty much the same price. It is tough to get rich peddling ketchup; equally, it's tough to get rich selling plain vanilla governments.

Hence, dealers are always on the outlook for a new proprietary product—something they can sell to retail *at a spread* because they are the only or the first suppliers of that product. Some years back, dealers, led by Merrill, started setting up trusts backed by Treasuries through which they sold to retail Treasury income growth receipts (TIGRs) and a zoo of other homemade, zero-coupon Treasuries. That game was so profitable for the dealers that the Treasury preempted the profit in it by permitting a more efficient stripping of Treasuries via the book-entry system. Dealers, undeterred, went on to other pastures: they used mortgages to back yet new sorts of hybrid paper; created hedged transactions in foreign currency-denominated paper; created, priced, and sold interest-rate caps, collars, and floors; and so on and on.

One way to make money on customer business is via financial innovation. Seeing this, dealers have combed the universities and other institutions to find people with strong backgrounds in math and finance—*quants* or *rocket scientists* as they have been dubbed—paying them astronomical salaries, and asking them to engineer new derivative products, including options and other hybrids, that can be sold to retail at a spread.

A recent innovation that has seen rapid growth is the *credit default swap* (CDS), which has become the most widely used instrument in the credit derivatives market. The International Swaps and Derivatives Association (ISDA) estimates that the notional value of CDSs outstanding at the end of 2005 was a whopping \$17.096 trillion, a sharp increase from four years earlier when there were \$631.5 billion outstanding. In a credit default swap, an investor (the protection seller) sells protection against the possibility of a bond's default to a buyer (the protection buyer) seeking such protection (Figure 10.1). In return for the protection, the protection buyer makes periodic payments to the protection seller until the maturity date of the contract or until a credit event occurs. Typical terms for CDSs are for five years. Dealers have profited trading the spreads on CDSs, particularly banks, which are the biggest buyers and sellers in the CDS market.² Insurance companies rank second, followed by securities firms and hedge funds. Proprietary trading desks at some of the larger dealers

² Jorge A. Chan-Lau and Yoon Sook Kim, "Equity Prices, Credit Default Swaps, and Bond Spreads in Emerging Markets," The International Monetary Fund, Working Paper, August 2004.

FIGURE 10.1**Credit default swap**

Source: International Monetary Fund

have also become active players, making bets—usually hedged—in the CDS market on the gyrations in credit spreads.

Yet another way dealers seek to profit from customer business is by having their traders develop and pass on to retail good ideas on trades to be done—on what is cheap and what is expensive. This tack works better on complex securities, such as mortgage-backed securities and their derivatives, than in Treasuries. In the former market, the implied prepayment option in a mortgage often causes mortgage-backed products to trade in unexpected ways, as rate levels move and the yield curve shifts.

Position Profits

A dealer, depending on the product, the market, and her mood—"I'm bullish"—or "Ouch, I just took a *big* hit"—may look to *position taking* to make big profits. If customers are in a mood to buy and if a dealer thinks the market will rally or continue to rally, she might want to add \$150 million or whatever to her positions with the intent to hold those positions for some time until she can sell them out at a tidy profit.

Traditionally, the appetite of some shops to position, *to speculate*, has been stronger at some shops than at others.³ One might argue that positioning done specifically to speculate, as opposed to positioning that arises out of a dealer's daily trading activities with retail and with other

³ The term *speculation* as used here and throughout this book is *not* meant to carry any pejorative connotation. *Speculation is taking an unhedged position, long or short.* A homeowner who buys a house financed with a mortgage is assuming a speculative, leveraged position in real estate. A dealer who buys governments with repo money is assuming a speculative, leveraged position in governments. The only difference between the two is that the dealer *knows* it is speculating; the homeowner doesn't think of it that way.

dealers, is not an inherent part of being a market maker. Such speculation serves, however, useful functions. It guarantees that market prices will react rapidly to any change in economic conditions, in demand, in supply, or in rate expectations. Also, and more important, the profits dealers can earn from correct position plays are a prime incentive for them to set up the elaborate and expensive operations that they daily use to trade with retail and each other. In effect, position profits help to oil the machinery that dealers need to be effective market makers.

Dealers possess no crystal balls enabling them to perfectly foresee the future. They position on the basis of carefully formulated expectations. When they are right, they can make huge profits; when they are wrong, their losses can be staggering. Thus, the successful shops, the ones that survive, are right on the market more often than they are wrong.

As noted, dealers' appetite for positioning changes in part with economic conditions. In the early 1980s, when interest rates were high and highly volatile, dealers knew that to make money, they would have to focus on the real nuts and bolts of the business—service. They looked at their business as one in which they could provide their clients with access to the market, investment advice, risk transfer, and execution. Put another way, they made their money servicing retail. When conditions stabilized in the latter half of the decade, spreads shrunk to the point where it became questionable how much profit there was in doing customer trades. This increased the necessity to position because to do customer business alone does not make traders successful. In the 1990s and early 2000s, the increased use of electronic platforms and increased price transparency caused spreads to continue to tighten, thus increasing the impetus to take positions. Electronic trading has also reduced the cost of executing trades, which has provided dealers with added incentives to take positions.

Another factor in a shop's appetite for position plays is the way it is organized. Banks, as highly visible, publicly owned institutions, have always operated under a lot of pressure from bank analysts to generate a *steadily growing* profit stream; they earn no brownie points for making big capital gains this quarter and none the next. Big nonbank dealers organized as partnerships used not to be under the same pressure, but when they went public, they began to sound and act like banks, although they remained more aggressive traders than most banks. As highly visible public firms, dealers have to look closely and leverage the consistency of their earnings in order to maintain appeal to the investors in both their stocks and bonds.

HEDGING

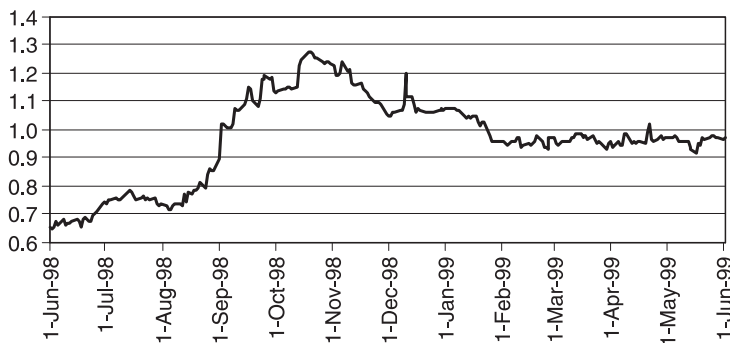
No dealer can stand ready to make markets to customers without holding inventory and being willing to position securities on which a customer wants a bid. Shops that stress making markets to retail realize this and emphasize techniques to minimize the risk inherent in being a market maker. One technique is hedging. Hedging, once a sometimes affair, currently gets a lot of attention, especially now that large and liquid futures markets exist for governments and Eurodollar deposits, and given the vast size of the derivatives market—the ISDA estimates that the total notional amount of interest-rate and cross-currency swaps outstanding at the end of 2005 was \$213.19 trillion. Using these markets, a dealer can transfer the risk generated by customer business back into the markets far faster than formerly, and dealers do just that.

Over time, hedging has evolved into an art form and is, for some products at some shops, an automatic response to position taking done to facilitate customer business. Years ago, a dealer wanting to hedge a position in cash securities had basically two choices: short a like cash instrument or short futures. Now that the menu of both products and derivative products has grown, new hedge trades have become routine. For example, a dealer might use an interest-rate swap to hedge a position in MTNs, a short of cash Treasuries to hedge an interest-rate swap, a short of Eurodollar futures to hedge commercial paper, a cap to hedge a floor, or options on futures to hedge mortgage-backed securities, and so on and on. The possibilities keep growing.

Most times, a trader doing a hedge does not completely eliminate risk, because the item she sells differs somewhat from the item she bought. In that case, the hedger has residual spread risk: during the time of her hedge, the spread between the yields on the items she's long and short might move against her. On a well-constructed hedge, residual spread risk is far less than the market risk inherent in the position hedged. Thus, whenever hedging does not eliminate position risk, it at least substantially reduces it. Still, there have been occasions where the residual risk has resulted in substantial losses. One of these was during the Asian financial crisis in 1998, particularly after Russia defaulted on its debts. Some dealers had "hedged" their holdings in corporate bonds by shorting Treasuries, but they incurred steep losses when panicky investors sold corporates and bought Treasuries, causing credit spreads to widen substantially (Figure 10.2).

FIGURE 10.2

Yield spread between A-rated industrials and 10-year T-notes
(in percentage points)



Source: Bloomberg

DEALER FINANCING AND CARRY

The typical dealer is running a highly leveraged operation in which securities held in position may, depending on whether she's a bank or a non-bank dealer and on the types of securities she trades, total 40, 50, or 100 times capital. Dealers used to rely heavily on dealer loans from New York banks for financing, but repo money is cheaper, and dealers rely chiefly on it to meet their primary financing needs. For such dealers, the need to obtain repo money on a continuing basis and in large amounts is one additional reason for assiduously cultivating retail customers. The money funds, corporations, hedge funds, foreign investors, state and local governments, and other investors that buy governments and other instruments from dealers are also big suppliers of repo money to them.

Much of the borrowing dealers do in the repo market is done on an overnight basis (see Chapter 13). The overnight rate is typically the lowest repo rate. Also, securities "hung out" on repo for one night only are available for sale the next day. Nonbank dealers have to clear all their repo transactions through the clearing banks, which is expensive. As a result, they also do a lot of *open repos* at rates slightly above the overnight rate. Open or demand repos have an indefinite term; either the borrower or the lender can, each morning, choose to terminate the agreement.

Many banks prefer to do overnight repos with customers who will permit them to safekeep the securities bought. This saves clearing costs

and ensures that the bank will have the securities back early the next day. If repoed securities are transferred out of the bank, there is always the possibility that the securities will be delivered back to the bank too late the next day for the bank to repo them again or to make timely delivery if they have been sold. To make repo as convenient an investment as possible, some banks have minimum balance arrangements with customers under which any excess deposit balances the customer holds with them are automatically invested in repo. In effect, what such a bank is doing is getting around Reg Q and paying the customer interest on any demand deposits she holds in excess of any minimum compensating balance the bank requires her to maintain.

The financing needs that nonbank dealers do not cover in the repo market are often met by borrowing from banks at the dealer loan rate. Even dealers who look primarily to the repo market for financing will use bank loans to finance small pieces they hold in inventory. Such dealers feel that it is too costly to write tickets and make deliveries on small positions. They'd rather let small positions sit rather than combine them and trade repo.

In financing, bank dealers have one advantage over nonbank dealers—they can finance odd pieces they do not repo by buying fed funds.

While much dealer financing is done using open or very short repos, dealers will sometimes finance speculative positions they anticipate holding for some time with term repo, taking in money for 30, 60, or 90 days, or even longer.

Fails and the Fails Game

If, on the settlement date of a trade, a seller does not make timely delivery of the securities purchased, delivers the wrong securities, or fails in some other way to deliver in proper form, the trade becomes a *fail*. In that case, the buyer does not have to make payment until proper delivery is made, presumably the next day; *but* she owns the securities as of the initially agreed-upon settlement day. Thus, on a fail the security buyer (who is *failed to*) receives a one-day free loan equal to the amount of the purchase price, that is, one day's free financing. And if the fail persists, the free loan continues. Fails occur not only in connection with straight trades, but in connection with repos; on a repo, the lender has to make timely return of the collateral she is holding to unwind the transaction and get her money back.

The amount of fails that occur are tracked daily by the Federal Reserve Bank of New York and released every Thursday at 4:15 p.m. (ET), on a one-week lag. The Fed has been collecting data on fails since July 1990, but it wasn't until March 2004 that the Fed began releasing the data to the public. In recent years, the amount of fails has increased sharply, from an average of \$3.8 billion per day between mid-1990 and September 5, 2001, to as much as \$232 billion per day in the summer of 2003.⁴ These figures include fails on Treasury, agency, mortgage-backed, and corporate securities. The data show that Treasury fails averaged \$10.7 billion per day during the period July 4, 1990, to December 29, 2004. Sharp increases in fails during the period tended to be associated with variations in the incentive to avoid failing.

Dealers often play some portion of their financing needs for a fail; that is, they estimate on the basis of past experience the dollar amount of the fails that will be made to them and reduce their repo borrowing accordingly. If their estimate proves high, more securities will end up in their box at the clearing bank than they had anticipated, and that bank will automatically grant them a box loan against that collateral. On such last-minute loans, the clearing banks charge the dealer a rate that's a tiny margin above their posted dealer loan rate to encourage dealers to track their positions and run an orderly shop. A dealer who plays the *fails game* is in effect using her clearing bank as a lender of last resort.

A common reason for fails relates to what is known as a "*daisy chain*" of fails, wherein one dealer's failure to deliver causes another dealer to fail on a delivery of the same securities to another party, sparking additional fails. A "*round robin*" occurs when the succession of fails results in the failure of delivery to the initiator of the fails at the end of the chain.

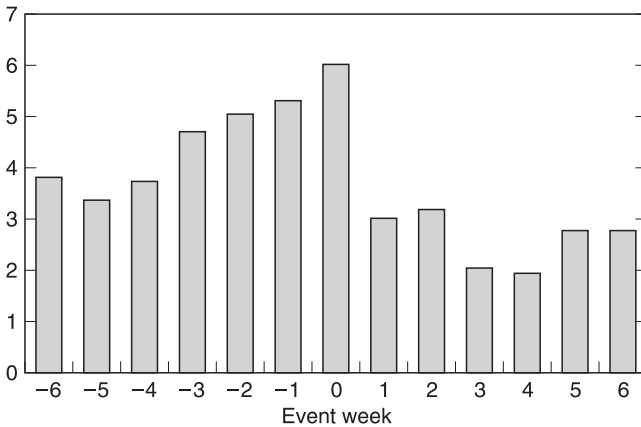
As we said, many fails occur because there is too little incentive to avoid failing. This is especially true when funding costs for the securities to be delivered are close to the general collateral repo rate. When it is, dealers who are required to make deliveries aren't as motivated to make deliveries as they are when the financing cost is lower.

Fails tend to increase in the weeks leading up to the Treasury's quarterly refunding, which takes place in February, May, August, and November (Figure 10.3). This occurs primarily because the financing cost

⁴ Michael J. Fleming and Kenneth D. Garbade, "Explaining Settlement Fails," The Federal Reserve Bank of New York, *Current Issues in Economics and Finance*, September 2005.

FIGURE 10.3

Settlement fails around quarterly refundings (in billions of U.S. dollars)



Source: Federal Reserve Bank of New York

for many Treasury securities often increases, owing to reductions in the supply of securities available for borrowing (as the refunding draws near, fewer securities are made available by those who own them), and because the dealer community tends to increase its short-selling activities, which boosts the demand for borrowed securities. Fails also tend to increase around the end of a calendar quarter owing to increases in financing costs that occur when securities lenders refrain from lending their securities (Figure 10.4).

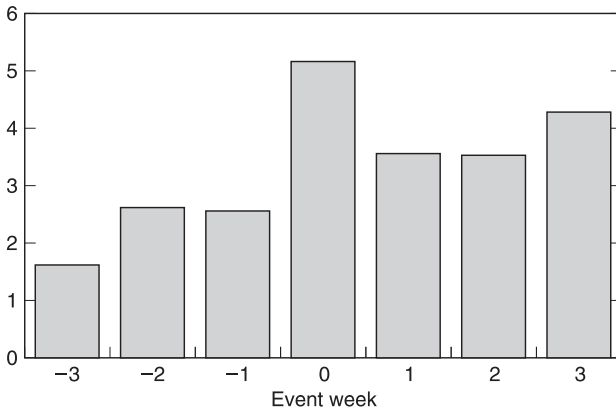
A DEALER'S BOOK

A dealer who takes big positions is operating like a banker. The dealer acquires assets of varying types and maturities and incurs liabilities of varying maturities to finance them. And, like a banker, the dealer faces *risks*: credit risks, a rate risk, and a liquidity risk.

Because dealers generally confine themselves to buying high-grade paper, as opposed to lending money to borrowers of suspect credit quality, dealers assume fewer and smaller credit risks than banks do. But because they borrow so much short-term money and are so highly leveraged, the rate risk they assume is substantial. This is especially true because the classic way dealers make a bullish bet is not only to buy *more*

FIGURE 10.4

Settlement fails around quarter-ends (in billions of U.S. dollars)



Source: Federal Reserve Bank of New York

securities, but to *extend* to longer maturities where they get more bang for the buck from rate movements.

Every dealer, because it is exposed to a large rate risk, is conscious that it is running a large *unmatched book*. Moreover, it seeks, like a bank, to profit from that mismatch while simultaneously monitoring it to ensure that it does not become so large that it is exposed to an *unacceptable level* of risk. Noted one dealer, “Any guy who can run a large dealer operation on leverage could run a bank, not the esoterica of loans to Zaire, but the nuts and bolts of asset and liability management.”

While bankers talk about managing the mismatch in their book, dealers talk about *tail management*, by which they mean the same thing. Dealers also talk about *indexes*, where an index is some average of asset and liability maturities that indicates the rate risk to which they are exposed.

One difference between dealers and banks is that there is much more pressure on the dealer to be right and to be right in the short run. One reason is that dealers mark their assets to market daily and track daily their profits and losses overall and by instrument. A second reason is that dealers’ annual compensation is tied closely to performance through bonuses or other devices. As one dealer noted, “If we buy at the wrong moment, we cannot hold a 2-year note, let alone a 10-year bond, to maturity not

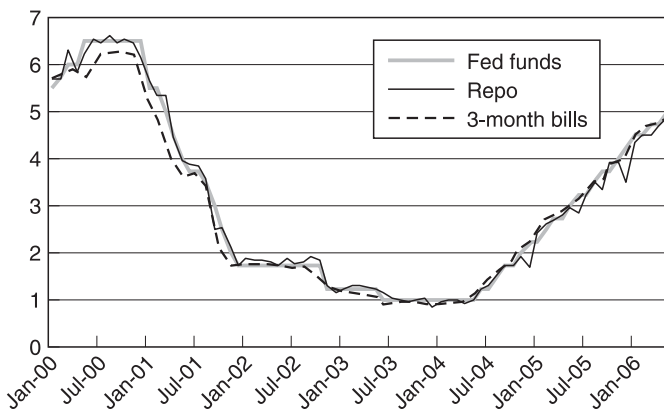
only because of profit considerations, but because of the emotional and psychological damage that holding that security and marking it to market would have on the work group. We have to be right on balance, and we don't have the luxury of being able to wait for the long run to prove us right." A bank, in contrast, while it marks its dealer and trading portfolios to market, may or may not track the performance of its investment portfolio as frequently, and it certainly does not attempt to mark its loans to market. Thus, in managing its overall position, a bank can brush under the carpet the consequences of at least some ill-conceived plays by lumping their impact on profit in with overall profits instead of isolating them.

Interest-Rate Predictions

The key rate in the money market is the fed funds rate. Because of the role of this rate in determining dealers' cost of carry (the repo rate is usually slightly below the funds rate), other short-term rates key off the fed funds rate in a fairly predictable way (Figure 10.5). Thus, when a dealer positions, it does so on the basis of a strongly held view with respect to where the fed funds rate is headed; and *every long position the dealer assumes is, in particular, based on an implicit prediction of how high fed funds and*

FIGURE 10.5

Short-term rates key off the fed funds rate (in percentage points)



Sources: Federal Reserve, Bloomberg

other money market instruments might trade within the time frame of its investment. The fed funds rate plays a major role in a dealer's decision to take positions in a variety of strategies including those related to swaps, the yield curve, mortgage-backed securities, credit spreads, and so forth. In formulating expectations about the funds rate, dealers engage in constant and careful Fed watching of the sort described in Chapter 9.

Confidence Level in Positioning

Positioning is a form of gambling, and the dealers most skilled in this art attempt first to express their expectations about what might occur in terms of probabilities of various outcomes and second to estimate the payoff or loss that a given strategy would yield if each of these outcomes were to occur. Then, on the basis of these numbers, they decide whether to bet and how much to bet.

Probabilists who have theorized about gambling like to talk about a fair gamble or a *fair game*. A fair game is one that, if played repeatedly, will yield the player neither net gains nor net losses. For example, suppose a person plays the following game: A coin is flipped; if it lands heads up, she wins \$1; if it lands heads down, she loses \$1. The probability that the coin will land heads up is $\frac{1}{2}$. So half the time she bets our player will lose \$1; half the time she will win \$1; and her *expected winnings or return*, if she plays the game repeatedly, is *zero*.

There is nothing in it for a dealer to make a fair bet. What it looks for is a situation in which expected return is *positive*; and the more positive it is, the more the dealer will bet. For example, if a dealer believed: (1) that the probabilities that the Fed would ease and tighten were 60% and 40%, respectively, and (2) that a given long position would return \$2 to the dealer if the Fed eased and would cause a loss of \$1 if the Fed tightened, then the dealer's *expected* winnings would be

$$0.6 \times \$2 - 0.4 \times \$1 = \$0.80$$

In other words, the gamble is such that, if the dealer made it 10 times, her expected winnings would be \$8. That degree of favorableness in the bet might suffice to induce the dealer to position.

If the game were made still more favorable, for example by an improvement in the odds, then she would gamble still more. For example, if the dealer believed: (1) that the probabilities that the Fed would ease and tighten were 70% and 30%, respectively, and (2) that a given long

position would again return \$2 to the dealer if the Fed eased and lose \$1 if the Fed tightened, then her expected winnings would be

$$0.7 \times \$2 - 0.3 \times \$1 = \$1.10$$

In other words, the gamble is such that, if the dealer made it 10 times, her expected winnings would be \$11. That's the sort of gamble that might cause the dealer to pull up the delivery trucks and position securities in size.

All this may sound a bit theoretical, but it is the way good dealers think, explicitly or intuitively; and such thinking disciplines them in positioning. As one dealer noted: "The alternative is a sloppy operation in which a dealer runs up his position because he sort of likes the market now or runs it down because he doesn't like the market."

Quantifying her thinking about the market also helps a dealer provide retail with useful suggestions. Most customers can find fair bets on their own, but they appreciate a dealer who can suggest to them a favorable bet, that is, one on which the odds are out of synchronization with the payoff and the expected return is therefore positive.⁵

In quantifying expectations and payoffs and acting on them, fleet-footedness is essential. Everyone on the Street is playing the same game, and the market therefore frequently anticipates what the Fed is going to do. Thus, the dealer who waits until the Fed is ready to move will probably be too late to make money, the market having already discounted much of or that entire move.

The Maturity Choice

We suggest that the more favorable the gamble a dealer faces, the more securities she's likely to position. And this is precisely the way dealers talk about what they do; specifically, dealers frequently comment, "The higher

⁵ To keep things simple, we assume in our examples that only two interest-rate outcomes were possible. More might be, each with its own associated payoff. Let p_1 equal the probability of the first interest-rate outcome and x_1 the associated payoff; p_2 the probability of the second interest-rate outcome and x_2 the associated payoff; and so on. Then the expected return or value (E) on a bet in which it is assumed that the Fed might peg fed funds at any one of three possible levels would be:

$$E = p_1x_1 + p_2x_2 + p_3x_3$$

Using this approach, one can easily generalize the technique to any number of possible outcomes.

our *confidence level*, the more we will position.” Translated into the jargon we used, this means simply that the higher the probability associated with gain and the lower that associated with loss (that is, the higher the expected return), the more the dealer will bet.

There is, however, one more wrinkle to the dealer’s positioning decision. As noted, a classic part of a bullish strategy is for a dealer to extend to longer maturities. The reason the dealer is tempted to extend is that the longer the maturity of the securities she positions, the more price play it will get. To illustrate, suppose that a dealer believes that the probability that the average Fed funds rate will *fall* by 1 point is 70%, and the probability it will *rise* by 1 point is 30%. If the dealer positions the 90-day bill, which has a yield that is likely to move roughly as many basis points as the fed funds rate does, she will be making a bet on which her potential gains and losses per \$1 million of securities positioned are \$2,500. If alternatively—to make the example extreme—she invests in the 4.5s of 2036, the dealer’s potential gains and losses will be in the range of \$21,000 per \$1 million even if a 1-point move in the fed funds rate is assumed to move the yield on these securities only 15 bp. Whether the dealer positions 90-day bills or the 4.5s of 2036, the dealer is making a favorable bet. However, positioning the 4.5s of 2036 is a much *riskier* bet because, if rates rise, the dealer will lose much more owning the 4.5s of 2036 than she will owning the 90-day bill.

Dealers are very conscious that extending to longer maturities exposes them to greater *price risk*. They also tend to think that extending to longer maturities exposes them to greater risk for another reason; namely, the predictability of long-term rates is less than that of short-term rates. Short-term rates relate directly to Fed policy; long-term rates do so to a much lesser extent because they are also strongly influenced by inflation expectations, global events, the *slope* of the yield curve, and many other factors. Thus, the dealer who extends must be prepared not only to predict Fed policy but also to predict shifts in the slope of the yield curve—an art that is separate from and, in the eyes of many dealers, more difficult than successful Fed watching. That said, history shows that yield curve trends tend to be long lasting, so when a yield curve trend becomes apparent, predicting the slope of the yield curve can actually prove easier than predicting Fed policy. Such was the case at the end of 2005 and early 2006 when predicting the end of the Fed’s rate hike cycle became a source of uncertainty; meanwhile, expectations for continued flattening of the yield curve stayed largely intact.

To protect against the risks posed by extending maturity, some dealers confine their unhedged positions largely to securities of short current maturity. A dealer typical of this group noted, “We are accused of being an inch wide and a mile deep—the mile deep being in securities with a maturity of a year and under. There are various arts in this business: predicting spreads, predicting the yield curve, predicting the trend in interest rates. You go with the learning curve of the organization you have, and ours is very strong in predicting short-term spreads and yields.”

Other dealers are more willing to extend maturity to reach for gains, but in doing so, they seek to control carefully the price risk they assume. The guidelines used to control price risk—frequently they take the form of smaller position limits on longer maturities—vary considerably from shop to shop. One reason is that there is no certain way a dealer can compare the risk it assumes in holding 5-year notes to that it assumes in holding 6-month bills. Another is that, in establishing position limits by instrument and maturity, a dealer is inevitably making subjective judgments about the ability of each of her traders.

SHORTING

When money market dealers are bullish, they place their bets by positioning securities: when they are bearish, they do so by shorting. One might expect that the quantity of securities a dealer would short, if she believed that the probability of a fall in securities prices was 80%, would be as great as the quantity of securities she would position if she believed that the probability of a rise in securities prices was 80%. But in fact dealers will, at a given confidence level, short smaller amounts of securities than they would position. There are several reasons. First, the only instruments dealers are comfortable shorting in large size are governments and agencies; other instruments, such as commercial paper, MTNs, corporates, and muni notes, are too heterogeneous with respect to name, maturity, and face amount to short. Second, shorting securities tends to be more cumbersome and expensive than going long because the short seller must find not only a buyer, but—since the shorted securities must be delivered—a source of these securities.

Over time, it has become increasingly common for dealers to *reverse* in securities shorted rather than to borrow them. One reason is that the reverse may be cheaper. When a dealer borrows securities, she gives up other securities as collateral and pays the lender a borrowing

fee, which typically equals as much as $\frac{1}{2}$ of 1% but may be more if many people want to short an issue at once. On a reverse, the dealer obtains the securities shorted by buying them from an investor with an agreement to repurchase. In effect, the dealer is extending a collateralized loan to the owner of these securities. The owner takes the loan because she needs cash or, more typically, because she can reinvest the loan proceeds at a higher rate, and the reverse thus becomes part of a profitable arbitrage.

Whether a dealer borrows securities or reverses them in, she must make an *investment*—in the first case in collateral, in the second case in a loan to the institution on the other side of the reverse. To figure which investment would yield more, the dealer compares the rate she could earn on the collateral *minus* the borrowing fee with the reverse rate. For example, suppose a dealer has some short-dated paper yielding 4.625% she could use as collateral. If she did so, she would own that paper at 4.625% minus the 0.5% borrowing fee; that is, at an effective rate of 4.125%. If the reverse rate were 4.5%, she would do better on the reverse.

A dealer's overall cost on a short is (1) the interest that accrues on the securities shorted (rise in value in the case of a discount security) over the period the short is outstanding *minus* (2) the yield on the offsetting investment she makes. If the reverse rate exceeds the net rate she could earn on collateral backing a borrowing, reversing will be the cheaper way to support the dealer's short.

A dealer who borrows securities to support a short never knows with certainty how long she can have those securities because borrowed securities can be called by the lender on a day's notice. Recent innovations in the repo market have reduced this possibility, particularly the introduction of GCF Repo in 1998 (see Chapter 13), but the risk of a security being called still exists. If, alternatively, a dealer reverses in securities for a fixed period, she knows she will have the securities for that time. Thus, a dealer who anticipates maintaining a short for some time may choose to cover through a reverse rather than a borrowing because it offers greater certainty of availability.

REPO AND REVERSE BOOK

A large dealer who is known to the Street can borrow more in the repo market and at better rates than can a small dealer or a corporate portfolio manager. Thus, a large dealer finds knocking at her doors not only

customers who want to give her repo money, but would-be borrowers who want to reverse out securities to the dealer because that is the cheapest way they can borrow. In response to the latter demand, large dealers have taken to doing repo and reverse not just to suit their own needs but as a profit-making service to customers. In providing that service, the dealer takes in securities on one side at one rate and hangs them out on the other side at a slightly more favorable (lower) rate; or to put it the other way around, the dealer borrows money from her repo customers at one rate and lends it to her reverse customers at a slightly higher rate. In doing so, the dealer is acting like a bank, and dealers know this well. As one noted, “This shop *is* a bank. We have customers lining up every morning to give us money. Also we are in the business of finding people who will give us securities at a little better rate than we can push them out the repo door. So we are a bank taking out our little spread, acting—if you will—as a financial intermediary.”

A dealer who seeks to profit by borrowing in the repo market and lending in the reverse market ends up in effect running *a book* in repo. And, like a bank, she can mismatch that book to increase her profit, that is, borrow short and lend long. A dealer who runs a short book in repo incurs not only a rate risk, but other risks as well (see Chapter 13). The total amount of repos outstanding stood at \$3.4 trillion in June 2006.

ARBITRAGES

Arbitrage is another activity from which dealers seek to develop consistent profits—not spectacular gains but 5 bp here and 10 there earned by observing an anomaly in the market, taking a position against it, and then having the patience to wait until natural market forces eliminate that anomaly and permit the arb to be unwound at a profit. Such strategies have seen their profit potential reduced in recent years owing to the more widespread use of sophisticated software programs designed to capture such anomalies, and because the globalization of trading has increased the number of investors doing arbitrage. Arbitrage opportunities nonetheless remain, and dealers have found new ways to profit by broadening out into new products and foreign markets to find anomalies. One of these is the mortgage-backed securities market, where many dealers employ an array of quants to look for trading opportunities. It is a market that has grown sharply in recent years to become the largest segment of the bond market, at \$6.1 trillion as of March 31, 2006.

Strictly defined, the term *arbitrage* means to buy at a low price in one market and to simultaneously resell at a higher price in another market. Some arbitrages in this strict sense do occur in the money market. For example, when a British bank sells deposit notes at 50 over (Treasures), swaps the proceeds at 80 over to get funding at LIBOR minus 30, and simultaneously buys other banks, Eurodollar CDs at LIBOR flat, it is engaging in arbitrage in the strict sense of the term. Another example of pure arbitrage would be a dealer who takes in collateral on a reverse for a fixed period and repos at a lower rate for precisely the same period, that is, a matched transaction in repo.

Money market participants use the term *arbitrage* to refer not only to pure arbitrages, but to various transactions in which they seek to profit by *exploiting anomalies* either in the yield curve or in the pattern of rates established between different instruments. Typically, the anomaly is that the yield spread between two similar instruments is too wide or too narrow; that is, one instrument is priced too generously relative to the other. To exploit such an anomaly, the arbitrageur *shorts* the expensive instrument and goes *long* in its underpriced cousin; in other words, she shorts the instrument that has an abnormally low yield relative to the yield on the instrument in which she goes long.

If the arbitrageur is successful, she will be able to unwind her arbitrage at a profit because the abnormal yield spread will have narrowed in one of several ways: (1) the security shorted will have fallen in price and risen in yield, (2) the security purchased will have risen in price and fallen in yield, or (3) a combination of the two will have occurred.

In the money market, yield spread arbitrages are often done (1) between identical instruments of similar maturity (one government is priced too generously relative to another government of similar maturity) and (2) between different instruments of the same maturity (an agency issue is priced too generously relative to a government issue of the same maturity).

Note that in strictly defined yield spread arbitrage (the long and the short positions in similar maturities) the arbitrageur exposes herself to *no market risk*. If rates rise, the resulting loss on her long position will be offset by profits on her short position; if rates fall, the reverse will occur. Thus, the arbitrageur is not basing her position on a prediction of the direction of market rates; she is concerned about a possible move up or down in interest rates only insofar as such a move might alter yield spreads in the money market.

An arbitrage in the purest sense of the term involves *no* risk, since the sale and purchase are assumed to occur simultaneously or almost so. An arbitrage based on a yield spread anomaly involves, as noted, no market risk, but it does involve risk of another sort: the arbitrageur is speculating on a yield spread. If she bets that a given spread will narrow and it widens, she will lose money. Thus, even a strictly defined yield spread arbitrage offers no locked-in profit.

Money market dealers actively play the arbitrage game. They have stored in a database all sorts of information on historical yield spreads and have programmed a computer to identify anomalies in prevailing spreads as they feed into it data on current yields. Dealers use the resulting “helpful hints to the arbitrageur” both to set up arbitrages themselves and to advise clients of arbitrage opportunities.

Generally, in a dealer shop, arbitrage is done in an account that is separate from the *naked trading* account. Arbitrage and naked trading are distinctly different lines of business. The trader who seeks to profit from a naked position long or short is a specialist in one narrow sector of the market, and the positions she assumes are based on a prediction of interest-rate trends and how they are likely to affect yields in her sector of the market. The arbitrageur, in contrast, has to track yields in a number of market sectors, and if she engages in strictly defined yield-spread arbitrage, she is not much concerned with whether rates are likely to rise or fall.

Anomalies in yield spreads that offer opportunities for profitable arbitrage arise because of various temporary aberrations in market demand or supply. For example, if the Treasury were to unexpectedly change its auction schedule, some Treasury issues might trade rich or cheap relative to other issues, depending on the changes made. In such a situation, yield spreads between Treasury issues would likely move away from their “usual” levels for a time. Such out-of-line yield spreads would, for the time they persisted, create arbitrage opportunities for investors expecting the spreads to return to “normal.” A recent example was the elimination of issuance of 30-year bonds in 2001 and the subsequent reintroduction of the issue in 2006. Both episodes saw sharp changes in the yield spread between long- and short-dated maturities.

Today, a dealer’s arb trader is often referred to as a *curve trader* because she is taking positions, long and short, along the *yield curve*—making bets as to how two securities at different points along the yield curve will move relative to each other. For more examples of yield-curve arbitrages, see Chapter 14.

Risk: The Unexpected Occurs

When a strictly defined yield spread arbitrage fails to work out, the reason is usually that something unexpected has occurred. In the money market, an added reason is that dealers often engage in yield spread arbitrages that are not strictly defined. For example, dealers will often go long an issue of one maturity and short another issue of quite different maturity. An arbitrage of this sort resembles a strictly defined yield spread arbitrage in that it is a speculation on a yield spread. However, it is more risky than such an arbitrage because, if interest rates move up or down, the price movement in the longer-maturity security will normally exceed that in the shorter-maturity security; thus, the arbitrage exposes the investor who puts it onto a *price risk*.

Dealers are aware of this and attempt to offset the inherent price risk in an arbitrage involving securities of different maturities by adjusting the sizes of the two sides of the arbitrage, as in the arbitrage example above. If, for instance, the arbitrage involves shorting the 2-year note and buying the 5-year note, the arbitrageur will short more notes than she buys. Such a strategy, however, cannot completely eliminate market risk; a movement in interest rates may be accompanied by a change in the slope of the yield curve, and the difference in the price movements the two issues would undergo if interest rates changed can therefore only be estimated. Abrupt changes in the slope of the yield curve do not occur too often, so this risk is not normally too high. Nevertheless, changes in the slope of the yield curve tend to be long lasting. A recent example is the flattening of the yield curve that took place from 2003 to 2006, and the steepening trend that took place in the three years prior to that. During both periods, the Fed played a major role.

Bull and bear market arbitrages are based on a view of where interest rates are going. A bull market arbitrageur anticipates a fall in interest rates and a rise in securities prices. Thus, she might, for example, short 2-year Treasuries and go long in 10-year Treasuries on a one-for-one basis, hoping to profit, when rates fall, from the long coupon appreciating more than the short coupon. If, alternatively, the arbitrageur were bearish, she would do the reverse: short long governments and buy short ones.

An arbitrage can also be set up to profit from an anticipated change in the slope of the yield curve. For example, an arbitrageur who anticipated a flattening of the yield curve might buy notes in the 10-year area for high yield and short notes in the 2-year not necessarily on a one-to-one basis.

If the yield curve flattened with no change in average rate levels, the 10-year note would appreciate, the 2-year note would decline in price, and the arbitrage could be closed out at a profit.

Money market practitioners are wont to call any combination of long and short positions an arbitrage; however, as the maturities of the securities involved in the transaction get further apart, price risk increases, and at some point, the “arbitrage” becomes in reality two separate speculative positions, a naked long and a naked short.

Arbitrage Today

Once futures markets opened—first in bills, later in bonds, notes, and Eurodollars—arbitrages between cash and futures markets mushroomed. To an arbitrageur, a sale of a futures contract is a substitute for a short position in a cash security, and a purchase of a futures contract is a substitute for a long position in a cash security. Thus, the introduction of futures opened up new ways to do arbitrages that were once done strictly in the cash market.

A good arbitrageur is always alert to opportunities for trading around one leg of her arb to pick up a few basis points here or there. Before futures, that trading around used to involve moving from one cash security to another; now, it may involve moving from cash to futures or vice versa depending on how spreads move.

If the arbitrageur has any problems these days, it is that there are so many cash securities and so many futures contracts that the choice among alternatives is getting hard. Said one trader, “Say I want to do a yield-curve trade—long on the front end, short on the back end: Do I go long Eurodollar futures, cash bills, agencies, corporates, the repo market (collateral), or bond spreads; and on the back end, do I short the 10-year note, the note contract, bond futures, or cash bonds—and if I do cash bonds, do I choose current coupons or older issues?” Options on fixed-income securities and of other new instruments, including interest-rate swaps and mortgage-backed securities, have further widened the menu of opportunities and made the choices more difficult.

Support personnel play an important part in any arbitrage operation. As one dealer noted, “The one thing in an arbitrage account that can force a paper loss to become a realized loss is if you lose control of your ability to support your short side. You don’t want your traders worrying about when securities are due back, so you need someone else who assumes

responsibility for making sure that people doing repo and reverses keep the needed supply of securities you have shorted on hand.”

Money market dealers seek out promising arbitrage opportunities not only because they can profit from them in their own trading, but because arbitrage suggestions passed on to customers are a source of customer business. As one dealer commented, “We’re in a competitive business, and the customer looks for the people with the best ideas and information. If we supply them, she trades with us.”

The persistence with which dealers and their customers arbitrage every out-of-line yield spread they find has an important impact on the money market; it ensures that spreads relationships never get far out of line or, to put it another way, that the differences in the yields on instruments of different types and maturities consistently mirror differences in the liquidity and credit risk, if any, attached to these instruments.

Given all the arbitrage on the Street, the question arises: How can there be anything left to arbitrage, especially now in the information age when it seems that everyone is looking for arbitrage opportunities? The answer seems to be that opportunities continue to exist partly because of the constantly increasing size of the market, partly because of the constant entry of new investors, some of whom are unsophisticated players, and, finally and most important, the constant introduction of new products. As would be expected, opportunities for arbitrage increase noticeably in volatile markets. Such was the case in 1998 when the yield spread between old and new Treasuries widened sharply following the Russian debt default.

TAILS

Dealers who were bullish used to create tails as a way to pick up a profit if rates did in fact fall or, in some cases, just stayed flat. When carry is positive and the expectation is that rates won’t rise, traders still do this. As often or more often happens, however, traders create tails as part of what has come to be known as a *cash-and-carry* or *basis trade*: the purchase of a cash security which is simultaneously sold in the futures market and financed until expiration of the futures contract with term repo.

Tails can be confusing. The easiest way to explain them is with an example. We do so here with a cash-market trade. In Chapters 15 and 16, we work out cash-and-carry trades involving futures.

Assume that a dealer is operating in an environment in which 90-day bills are trading at a rate $\frac{1}{16}$ below the fed funds rate. Assume also that

fed funds are trading at 4.0, 90-day bills at 3.9375, and 30-day term repo at 3.75.

If in this environment the dealer were to buy a 90-day bill and finance it with 30-day term repo, she would earn over the 30-day holding period a positive carry equal to or a profit equal to 18.375 bp over 30 days. She would also have created a *future* 60-day bill, namely, the unfinanced *tail* of the 90-day bill purchased.

If the dealer thought, as dealers usually do, of the carry profit over the initial holding period as raising the yield at which she in effect buys the future security, then by purchasing a 90-day bill at 3.9375 and repoing it for 30 days at 3.75, the dealer would have acquired a future 60-day bill at a yield of 4.0294.⁶ The 18.375 bp of positive carry, which is earned for 30 days, adds only 9.188 bp to the yield at which the future security is effectively purchased because the latter has a maturity of 60 days, which is twice as long as the period over which positive carry is earned.

Faced with this opportunity, the dealer would ask: How attractive is it to contract to buy a 60-day bill at 4.0293 for delivery 30 days hence? Note that the dealer would precisely break even, clearing costs ignored, if she were able to sell that future bill at a rate of 4.0293. Thus, contracting to buy the future bill will be attractive if the dealer believes she can sell the future bill at a rate below 4.0293.

The dealer's answer to the question she has posed might run as follows: Currently, the yield curve is such that 60-day bills are trading at 10 bp below the rate on 90-day bills.⁷ Therefore, if the 60-day bill were to trade at 4.0293 one month hence and if yield spreads did not change, that would imply that a 90-day bill was trading at 4.1875 and fed funds at 4.25, that is, at a level approximately $\frac{1}{4}$ above the present rate. We do not believe that the Fed will tighten or that yield spreads will change unfavorably; therefore, we will do the trade.

If the dealer were correct—the Fed did not tighten and yield spreads did not change—she would be able to sell 30 days hence the future 60-day bill she had created at 3.8375, which is the rate that would be the prevailing rate at the time on the 60-day bill. In doing so, the dealer would make

⁶ Note that the *higher* the yield at which a discount security is purchased, the *lower* the purchase price. So buying the future security at 4.0294 is, from the dealer's point of view, better than buying it at 3.9375.

⁷ For this example, we are assuming that the 60-day bill is trading at 10 bp below the rate on a 90-day bill, at $3.9375 - 0.10 = 3.8375$.

a profit equal to 19.18 basis points (the purchase rate 4.0293 minus the sale rate 3.8375) on a 60-day security.

Of course, the dealer's predictions might prove to be favorable. Note, however, that she has some built-in margin of protection. Specifically, if the dealer is able to sell her future bills at any rate above 3.8375 but still below 4.0294, she will make some profit, albeit less than if it sold at 3.8375. If, on the other hand, rates or rate spreads move so unfavorably that the dealer ends up selling her future 60-day bill at a rate above 4.0294, she will lose money.

In deciding whether to buy securities and finance them for some period, dealers invariably "figure the tail," that is, determine the effective yield at which they are buying the future security created. Whether the security financed is a discount security or an interest-bearing one, this yield can be figured approximately as follows:⁸

$$\left(\begin{array}{l} \text{Effective yield} \\ \text{at which future} \\ \text{security is} \\ \text{purchased} \end{array} \right) = \left(\begin{array}{l} \text{Yield at} \\ \text{which cash} \\ \text{security is} \\ \text{purchased} \end{array} \right) \times \left(\begin{array}{l} \text{Rate of} \\ \text{profit} \quad \times \text{Days carried} \\ \text{on carry} \\ \hline \text{Days left to maturity} \\ \text{at end of carry period} \end{array} \right)$$

Risk

A dealer who engages in the sort of transaction we have just described incurs a rate risk. She might end up with a loss or a smaller profit than anticipated because the Fed tightened unexpectedly; because bill rates rose relative to the fed funds rate due to, say, increased supply, unusually large foreign selling, a change in investor risk preferences; or because a shift in the yield curve narrowed the spread between 60- and 90-day bills. Thus, when a dealer who thinks such a transaction would be profitable decides to take the position, the size in which she takes the position will depend both on the confidence she has in its rate and spread predictions and the amount of risk to which she thinks she would be exposed. The same sort of transaction could also be done in other short-term securities.

⁸ There is a bias in this approximation. For a formula giving the precise yield calculation on a tail, see Stigum and Robinson's *Money Market Bond Calculations* (McGraw-Hill), July 1996.

RELATIVE VALUE

We have said that a dealer will position securities if she is bullish. In choosing which securities to buy, the dealer considers relative value.

Every rational investor is interested in risk, liquidity, and return. Specifically, she wants maximum return, maximum liquidity, and minimum risk. When she shops for securities, however, she finds that the real world presents her with nothing but trade-offs; securities offering higher returns tend to be riskier or less liquid than securities offering lower returns. That is as true in the money market as elsewhere, and it is the reason money market dealers think first of *relative* value when they decide to position.

If the spread at which one security is trading relative to another more than adequately compensates for the fact that the high-yield security is riskier or less liquid than the low-yield security, the high-yield security has greater relative value and should be bought in preference to the low-yield security. If, alternatively, the spread is inadequate, then the low-yield security has greater relative value and should be bought in preference to the high-yield security. When dealers talk about relative value, they are really talking about the management of credit risk, market risk, and liquidity.

Relative value considerations arise not only in choices between different instruments, but in choices between different maturity sectors of the same market. A dealer might ask whether she should position 3-month or 6-month bills. If the yield curve were unusually steep out to six months and the dealer expected it to flatten, then the 6-month bill would have more relative value than the 3-month bill.

Relative value analysis, besides guiding a dealer in deciding what securities to position or short, is also useful for generating business with customers, and dealers use it that way constantly. To take an example, suppose commercial paper and bills in a given maturity range are normally spread X bp. The spread is now $X + 15$ bp, which more than compensates for the relatively greater risk and lesser liquidity of the commercial paper. Moreover, the dealer anticipates that the spread at which commercial paper trade to bills will narrow. Then the commercial paper has greater relative value than the bills, and by pointing this out to retail customers holding bills, the dealer could probably induce some of them to *swap* for a yield pickup out of their bills into commercial paper (to sell their bills and buy commercial paper).

These days investors have many more choices than they used to, which means that finding the best relative value trades requires much

more work than in the past. Dealers now have more sophisticated tools to help them to do the work. Some firms deploy in-house programs for relative value analysis. These programs look at every aspect of the securities comparing their maturities, amounts outstanding, coupon, and so forth, and they can do the work almost instantaneously. Many use the programs to find the best possible curve trades, swaps, box trades, and barbell trades, among other strategies. To underscore the global nature of relative value analyses these days, it is notable that some relative value programs, such as one deployed by Société Générale, are multilingual.

TECHNICAL ANALYSIS

In the days before the proliferation of professional financial computer systems such as Bloomberg, before futures were around, and later when they were still a mystery to lots of people, money market traders focused on fundamentals exclusively: How are economic conditions changing? What is the Fed doing? Where is relative value in light of the above?

With the advent of futures, money market traders imported charting and *technical analysis* from the futures markets, where fundamental analysis often takes a back seat. While technical analysis comes in a multitude of forms, it purports to be a method for gleaning information about *future* price movements from *past* price movements. People into technical analysis do moving averages of prices; look at point and figure charts; identify heads, shoulders, support and resistance levels; and so on (Chapter 14). The *efficient market hypothesis*, developed by economists studying stock prices, claims, depending on how strongly the hypothesis is asserted, that the current price of a security reflects all that is known and knowable about the value of that security, and what is knowable includes its past price performance. The clear implication of this much-tested and oft-sustained hypothesis is that technical analysis is worthless: the past behavior of a security's price has *no* predictive value with respect to the future behavior of that security's price.

That may be so, but nonetheless technical analysis has spread like a rampant virus through the trading community. Today, almost every trader has a point and figure chart of some sort in front of her.

One believer in technical analysis commented: "What technicals do is to show you a picture of price action and of levels of entering and exiting the market that are most efficient. Today, securities, foreign exchange

too, are all commodities. If everyone knows that a certain level is important, then whether it is, ultimately, the correct level at which to buy or sell the market, it will be a level at which lots of securities trade, simply because the charts identify that level as important.

“It has gotten to the point now that, on some days in a highly volatile environment when the market happens to be going down for whatever reason—maybe a bad piece of fundamental news—a lot of trading will occur at a particular level identified by the charts; and if that level fails, the market will just gap down to the next such level.”

Having said the above, the same trader went on to add: “Whether you assume that technical analysis, in and of itself, has any merit is irrelevant. It is followed by so many traders that, whether you believe the message you get from a chart or not, enough people do so that charts have an effect. There is *no* fundamental reason for charts to be correct. Still, I could not imagine doing business without the technical analysis that our firm has.”

The use of technical analysis has broadened thanks to the widespread use of professional financial systems. These systems make a full range of technical analysis available to subscribers at the touch of a button, doing so in a user-friendly environment. Gone are the days when traders have to draw their own charts by hand.

Dealers are compelled to use technical analysis because their clients do. The salespeople within these firms want to be sure that, when their clients begin discussing technical analysis, they can help their clients in some way and earn their keep, so to speak. This requires that they have some sense for technical analysis at all times.

Charts, it would seem, are here to stay. Whether a trader believes in them or not, she can’t ignore them, since so many other traders follow and act on them. To a believer in the efficient market hypothesis, the trading community appears less than 100% rational. However, that view is perhaps undemocratic. In a world where many embrace astrology, traders too surely have the right to be mildly loony—to engage in collective chart gazing if that pleases them.

RUNNING A DEALER OPERATION

We have talked a lot about how money market “dealers” operate, but a dealership, of course, consists of many people. At its heart are a position manager, who is invariably a highly savvy Street person, a group of specialized traders, and a sales force that contacts retail.

The position manager (or managers—in large firms responsibility is layered) has various responsibilities. First, she has to establish guidelines to limit the total risk the firm assumes at any one time. Second, it is her responsibility to develop a forecast of short-term interest rates—using inputs from her resident Fed watcher, her traders, and retail activity. Then, she must decide, based on the level of confidence she has in that forecast, whether her firm should make a market play, how big that play should be within the firm's position limits, and the instruments and maturity range in which the play should be made.

Establishing Position Limits

Years ago, dealers learned that interest rate volatility could result in big losses in their capital, so they began concomitantly to pay a lot more attention to risk management and in particular to the setting of position limits overall and at different points along the yield curve. Since risk defies precise measurement, different dealers set such limits in different ways. As a trader at one dealer noted, "Each trader has risk limits, and we have a risk desk that monitors them and management enforces them." A typical approach is for a dealer to start by saying: The most we are willing to lose in one day is \$X million. Next, for securities at different points along the yield curve, the dealer constructs volatility indices based on the past price behavior of these securities or on their respective durations. The firm might then use indices to establish maximum positions it is willing to assume at different points along the yield curve. Or, alternatively, the firm might say: "Given the current market environment, the maximum total position we will assume is \$2 billion. Our index tells us that long bonds are seven times as volatile as 2-year notes, so if we make our play the short end, we are willing to go up to \$2 billion, but if we make our play in long bonds, we'll do only $\frac{1}{7}$ of that."

Such adjustments to positions limits are the result of the varying risks associated with positions in different securities. This is one reason why dealers focus on duration rather than current maturity. The rationale behind doing so is described in Chapter 5.

Position guidelines are arbitrary at best, which is not to say that they are without purpose. Said one dealer, "We know our position limits are arbitrary, but they give us the comfort of knowing, when we go home at night, that we will still be in business tomorrow."

In implementing position limits, a dealer faces a delicate task. If she wants good traders, it has to give them some freedom, but the dealer can't

give them so much that she loses control over the size and composition of the firm's position. One manager described the problem well, "Every trader is entitled to trade his markets, to have a certain degree of free hand. Traders are big boys. Sometimes, however, I find, much to my dismay, that our bill futures trader is short, our bill trader long, our swap trader flat or a little long, and our coupon trader short. Thanks to the grace of God, it often all works out because our traders know their markets and the technicals in them. But when we are making a major position play, my allowance for each trader doing his own thing in his own market no longer holds. Then, I have to set the positions and the limits."

The Traders

Because there are so many types of money market instruments, because they trade so differently, and because they vary so in maturity, money market dealers all have a bevy of traders, each trading a single *narrow* sector of the market: short bills, long bills, 2- to 5-year notes, short agencies, MTNs, mortgages, and so on.

Trading on an hour-to-hour, day-to-day basis is a fine art that those with the inherent knack pick up through on-the-firing-line training. A good trader bases every trade she makes on her feel about the levels at which every instrument in which she deals ought to be trading. That feel will tell her, for example, that a 6 bid for one instrument is the same as a 13 bid for another; in other words, that she should be *indifferent* between selling one instrument at 6 and the other at 13. Also, if her market trades at a $\frac{1}{32}$ spread, she should be indifferent between buying the one instrument at 8 and the other at 15. So the trader will quote these two markets, 6-8 and 13-15. If someone hits her bid at 13 and takes her offer at 8, she will, if her indifference levels are correct, have earned $\frac{1}{32}$ and established a position (long in the one security and short in the other) that she can with patience unwind for another $\frac{1}{32}$. The unwinding is, of course, likely to occur one leg at a time. Retail might pick up the securities in which she is long, and then she would have to buy something else to keep her *net* book even. And if such *chain trading* caused a maturity gap in her book, she would seek out other trades to close it—tell the sales force to look to buy this or sell that. The essence of successful trading is to be able to set correct indifference levels and then keep the position moving—buying here, selling there, and picking up 128ths, 64ths, and 32nds along the way.

Of course, at times the firm may take a strong view with respect to where interest rates are going and want the trader to run a net long or short position in her book. To establish that position, she will have to be a net buyer or seller, but once she has established the position, trading again becomes calculating indifference levels and trading off them in a fashion that keeps her book where she wants it.

A trader is a highly paid professional whose life is her market. Most traders are young; they have to be since they operate under a lot of pressure, both because of the hectic pace of the market and because the results of what they do get thrown at them daily in the form of a profit and loss statement on their previous day's trades. Most traders are also highly competitive. As one dealer noted, "A trader is the archetype I-will-kill-you player of tennis, backgammon, and other games. She knows this is a killer business, and to her winning is everything—it's her mission in life, and when she wins, she won't even be nice about it."

A trader's job is to work not to manage. She has to quote markets, write tickets, and make things happen, all the while interjecting her personality into what she is doing. Today, more and more traders have MBAs, but as one dealer noted, such training does not make a person a trader: "There are a lot of bright guys down here with degrees, and they construct models on the computer of future interest rates, but when Goldman's trader says to them, 'The 6-month bill is 29-28, what do you want to do?' they face a whole different class of decision. There may be beneficial sorts of training that could be given them beforehand, but there is no possible training for meeting that sort of situation well."

Creating a Trading Team

It is important to dealers seeking to control risk closely to achieve a high degree of discipline among their traders. In a firm that wants both to service retail and to limit risk, there is a natural, constant conflict between the firm and its traders. Traders do not want to be functionaries who buy here and sell there to satisfy either the needs of the firm's retail customers or the demands of its position manager. Traders want to be creative people who earn money by taking big positions and by being right on the market; they also have sensitive egos that get them into trouble.

One position manager, describing his efforts to control both risk and his traders, said, "We thought having a bunch of traders along the yield curve all trying to decide whether the market was cheap or expensive was

a poor way to manage risk. We had to retrain our traders—to get them a lot more comfortable with a team environment where we tell some guys that they have to sit out a rally because we are not going to make our play in their sector. I think we have one of the most effective trading desks on the Street. To get it, we had to get traders to think that the good trader is not the guy who buys a billion, but the guy who makes consistent profits during the year. We found that a trader feels a need to belong; he does not want to be out there all alone. As management, we share the risk with him all the way, which reduces the stress in his job. We want our traders around for a long time. The most disruptive thing to a trade or sales organization is continuous turnover—a condition endemic on Wall Street.

“Some ball clubs are a good model for what you find in a lot of undisciplined trading outfits. There are a lot of high-priced ball players all trying to wing a home run, but some of these teams have not won too many games. Our objective is not to have one winning season, but to build a number of steady revenue streams. If you don’t have such revenue streams, you are always going to be speculating instead of having the freedom to pick your spots. Since we have tried to speculate less, our record of making good speculations has improved.”

The last comment throws an interesting perspective onto our earlier observation that rate volatility has shifted the focus at more than one dealer shop from earning profits on speculation to finding consistent sources of revenue. The discipline of doing the latter may improve a dealer’s ability to do the former.

Sales Force

There is a lot of variability from dealer to dealer in the size of the sales force and its function. At one extreme are houses that are big in commercial paper and put their sales force to work selling certain credits and have them do repo as an afterthought. At the other extreme are the position houses that look to their sales force first as sellers of repo, second as a source of information on how retail is behaving in and views the market, and third as an outlet to retail business when the firm wants it. A few such firms even reward their sales forces according to the amount of repo they do, which is fairly unusual. During the 1990s and early 2000s, when the number of primary dealers shrank, sales personnel at the remaining dealers began to wear many more hats, selling a variety of different types of securities. At these firms, the sales force is filled with people who trade

not only Treasuries or agencies exclusively, but both of these and a variety of other securities.

The level of sophistication among sales personnel varies considerably. It takes little expertise to sell commercial paper to the average corporate treasurer but a lot to deal with some of the sharper players in the market.

In most corporations, running the short-term portfolio is a rookie job; in a scant few it is done by highly paid professionals. The dealers staff accordingly; rookies talk to and advise rookies, and pros talk to pros. Said one dealer, “It works fine hiring a rookie to talk to a rookie. They relate to each other and have a good time. I can’t have a hotshot trader of mine talking to the money trader of some average corporation. They’re separated by an unbridgeable cultural gap.”

THE GLOBALIZATION OF INVESTING

The past few decades have been marked not only by significant increases in the number and volume of financial products traded, but also by a trend toward globalization of financial markets. Globalization is a multifaceted phenomenon. At its simplest level, it can be taken to mean the trading of certain financial instruments 24, or nearly 24, hours a day, where the instruments traded include foreign exchange; Eurodollar time deposits, cash, and futures; and governments, cash, and futures. At a deeper level, globalization means the trend in major economies toward deregulation and securitization, a trend that permits entities native to one national capital market to operate with ease in another.

It is, for example, evidence of globalization that more than half of all primary dealers as of June 2006 were foreign dealers that came to the U.S. market—some via subsidiaries, some via the purchase of U.S. dealers. Meanwhile, U.S. dealers, nonbank and bank, have expanded their foreign activities, particularly in Europe, Asia, and Latin America.

Seen from a different perspective, globalization means that major borrowers worldwide perceive as potential investors in their paper not just native institutions, but institutions worldwide. In particular, the Treasury has come to rely on Asian institutional investors, particularly from Japan and China, to snap up a goodly chunk of its new debt issuance. These two countries, for example, collectively owned about \$1 trillion of the \$4.26 trillion of Treasuries outstanding as of May 2006. The United States, however, is not the only country that issues a lot of

new debt. Debt has grown pretty much everywhere, particularly in Japan where its debt-to-GDP ratio reached over 140% in the early 2000s owing to persistent yearly budget deficits. Europe has also been a large issuer of debt, with several countries within the European Monetary Union (EMU) running deficits above the 3% limit allowed by the rules governing participation in the EMU. It has thus become efficient for these countries to come up with mechanisms that would make it easy for investors to make a quick and dirty comparison of their debt with that of the big dog borrower, the United States. The French, for example, went from having a rigidly controlled market for their debt, *Obligations Assimilables du Trésor* (dubbed OATS), to a system that cloned in many respects the issuance and trading of U.S. Treasuries. The French now have a group of 21 primary dealers, consisting of 5 French institutions and 16 nonresident institutions, the latter of which includes 6 U.S.-based institutions, 3 British, 2 German, 2 Swiss, and 1 each from Italy, the Netherlands, and Japan. So, there are more than just a few French banks to help France sell its debt in ways that appeal to a global audience. The French also have auctions of their debt, standard maturities, and both a futures market and a market for options on futures. The result has been to increase the liquidity of French Treasuries and to make them much more attractive to foreign investors.

As they say, it takes two to tango. For markets to become truly global, it is not sufficient that borrowers seek to sell their paper to investors in other countries. The flip side is that previously parochial investors around the globe must experience a change in attitude. Not so many years ago, U.S. investors used to reason: I get dollars in; sooner or later, I will have to pay dollars out; therefore, I shall invest only in dollars, and I need pay little or no attention either to the exchange value of the dollar or to what goes on in other national capital markets. Today, that attitude has changed: U.S. investors are becoming more like European and Asian investors; the latter have long been very currency conscious and also knowledgeable about sovereign risk. Consequently, they were and continue to be willing to hold a broad basket of investments and to make short-term distinctions about where value lies. This is evidenced by the proliferation of mutual funds that invest in securities outside of the United States and the growth of exchange-traded funds (ETFs).

Nation by nation, deregulation and securitization have been catalysts for the globalization of capital markets. Another catalyst has been swaps: plain vanilla, one-currency coupon swaps, and cross-currency swaps.

Swaps permit financial alchemy, both nationally and internationally, on both assets and liabilities.

True globalization of financial markets is a situation in which all participants, regardless of their country of origin and regardless of what currency they take or pay in their normal course of business, have equal access and equal discretion over denominating their securities bets—asset or liability—in any currency and in any capital market. The world is not there yet, but it's continuing to move in that direction.

Global Dealers

Facing continued globalization, dealers are therefore likely to continue to expand their already widespread global presence. One of the advantages that native securities firms have over their foreign competitors is strong and long-standing relationships with big, native, institutional investors—and also with individuals, which is very important in the stock market and other markets in which individuals are important buyers: munis, CDs, and so on. Put another way, U.S. securities houses are finding that relying on cross-border business can be, in Tokyo, Moscow, Beijing, and elsewhere abroad, a recipe for starvation; to become profitable, they must behave like domestic securities houses and seek out local investors.

A clear lesson of the past is that securities firms seeking to expand internationally need to pick their niches with great care.

THE CLEARING BANKS

We have described the role of dealers as market makers in the money market. There are also other institutions that play a vital role in this process—the clearing banks and the brokers. The *clearing banks* clear, for nonbank dealers, trades in governments, agencies, and other money market instruments.

In acting as a clearing agent, a clearing bank makes payments against securities delivered into a dealer's account and receives payments made to the dealer against securities delivered out of its account. It also safekeeps securities received by a dealer and makes payments into and out of the account that the dealer holds with the bank. Finally, a clearing bank provides dealers with any financing they require at its posted *dealer loan rate*.

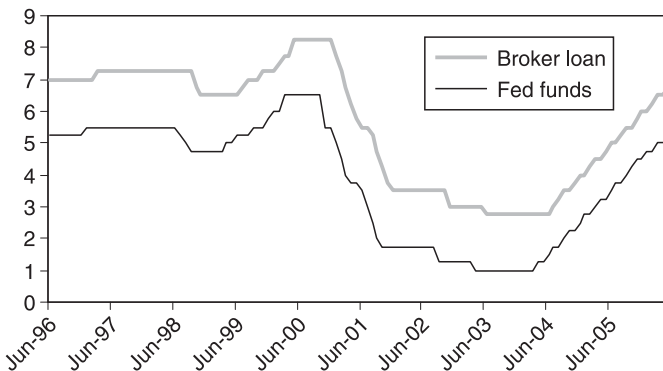
Dealer Loans

Extending dealer loans is an inherent and important part of a bank's clearing operations. When securities come into a clearing bank for a dealer's account, the banks pay for them whether or not the dealer has funds in its account, and it takes in any payment made to the dealer on security sales. Then at the end of the day, the bank net settles with each dealer. Since payments out of a dealer's account are made against the receipt of securities and payments in are made against the delivery out of securities, if a dealer ends up net short on cash for the day, it will have bought more securities than it sold, and the bank will have collateral against which to lend it. Dealer loans are always made on an overnight basis. The collateral is returned to the dealer's account the next morning, and its account is charged for the loan amount plus interest. Because overnight repo is cheaper than dealer loans (Figure 10.6), most dealers use dealer loans only to finance odd pieces and securities they hold because they failed on a delivery.

The clearing banks are happy with the relatively small reliance dealers place on dealer loans for their financing; in fact, they tell the dealers not to think of them as a primary supplier of position financing. The size of dealers' positions is so huge that these positions could not be financed in their entirety by the clearing banks or even by the whole New York banking community.

FIGURE 10.6

Broker loan rate versus fed funds rate (in percentage points)



Source: Federal Reserve

Clearing banks attempt to get estimates from the dealers of their anticipated borrowings as early as possible so that they can adjust their fed funds positions accordingly. A dealer may end up needing much less financing than it anticipated or significantly more. Thus, a clearing bank does not know the full size of its loans to dealers until after the national money market has closed, the Fed wire has closed, and sometimes the bank itself has closed. This causes the major clearing banks no problem in settling with the Fed because they have automated their wire to the Fed and know their reserve balance instantaneously even if they can't identify as quickly the sources and uses of funds that led to that balance.

On dealer loans, the clearing banks normally require collateral plus some margin of a few percentage points. If a dealer ends up with insufficient collateral, the clearing bank still makes all payments due out of its account and gives the dealer an overdraft, for which it charges a rate higher than its normal dealer loan rate.

Clearing banks are not the only banks that provide dealers with overnight money. If other banks happen to find themselves with excess funds, perhaps because they have been hosed with money by correspondent banks that sell them fed funds, they will call the dealers and offer them dealer loans at an attractive rate. Foreign banks also lend to dealers caught short too late to do more repo; the rate they charge is a small spread over the rate at which they can buy fed funds.

Clearing charges represent an important part of every dealer's costs. Clearing banks used to set their fees on the basis of the par value of the securities cleared. Then, as automation reduced their costs, they switched to a per-ticket pricing structure, and as they did, the net cost of clearing to dealers fell. Fees for clearing vary from bank to bank, and also at a given clearing bank they may vary for different dealers. As one dealer noted, "We have a sweetheart relationship with our clearing bank, and whatever the banks may say, such relationships are common."

COMMUNICATIONS

In a discussion of the makers of the money market, ignoring the phone company, CRTs, computers, and other communications facilities would be a serious omission. Without the phone companies and their foreign counterparts, the money market would be an utterly different place. That the money market is a single market that closely approaches the economists' assumption of perfect information is currently due in no small part to the

fact that New York brokers and traders are one push of a direct-phone-line button away from their clients, even those that reside in London, Singapore, and other distant spots. All this is extremely expensive but with the globalization of markets, instantaneous communication worldwide is, for a big securities firm, vital. Banks thus freely spend many millions of dollars on phone bills and other communications; and the nonbank dealers and brokers spend huge amounts in addition to that.

Information, Analytics, and Trading Systems

Several decades ago, the only way money market participants could get current quotes was by calling brokers and dealers. Moreover, to get a range of quotes, they had to make several calls because no quote system covered the whole market. Then, in 1968, a new organization, *Telerate*, began to remedy this situation by quoting commercial paper rates not on the phone, but on a two-page, *cathode-ray-tube* display system (CRT); it then had 50 subscribers. From this modest start, the system was quickly expanded because people wanted more information. Telerate is now just one of many vendors, but like many of its competitors, it offers a wide variety of information services including trading room systems, digital feeds, and analytics, for example. Whereas in the past these vendors were mostly information providers, today the information content that they provide is bundled with the various trading platforms the vendors offer. TelerateFeed, a Telerate product, is one example. It is a digital data feed that distributes market information and that can be integrated to interface with real-time trading platforms. Another augmentation to the “one-way” information systems of the past has been the increased use of these systems as communications platforms.

One of the more recent developments is the increased mobility of information content. In particular, users can now obtain a wide variety of content from their information vendors via their phones or other mobile devices as well as their home computer or computers they access from other locations.

A wide range of institutions—dealers, investors, and borrowers—now use an information vendor; its advent has not only eliminated a lot of phone calls but also vastly improved communications within the money market.

The Bloomberg system, or, as it is formally called, the Bloomberg Professional system, has arguably been the most important information,

analytics, and trading system used by the fixed-income community over the past two decades. The Bloomberg system is crammed with a deep database and functionality, but in its infancy it was initially blocked from logical expansion by a 1984 agreement with its backer, Merrill; under that agreement, Bloomberg could not sell terminals to a dozen of Merrill's biggest rivals until January 1, 1991. Since then, Bloomberg's growth has been rapid and in the middle of 2006 Bloomberg's Web site boasted that it had over 300,000 users in 125 countries.

The Bloomberg system is for many users the most comprehensive system available for information and analytics. At the touch of a few buttons, mountains of data can be retrieved. For example, the system contains a comprehensive and arguably unmatched database on a wide variety of economic statistics, from popular and widely followed statistics such as the U.S. unemployment rate, to arcane statistics such as the amount of vault cash on hand in U.S. banks. These data can be retrieved in many forms such as graphs or tables, and they can be analyzed in a multitude of ways. Users also have the ability to download data from Bloomberg's vast database for use in spreadsheets such as those that can be created using Microsoft's Excel program. Bloomberg users have a sense of community with one another, having the ability to communicate over the system via instant messaging and electronic mail. Over 1 million biographies can be found on the system, including those of its users. The system also has real-time and historical information on roughly 5 million bonds, equities, currencies, and funds.

Additional discussion about trading systems can be found in Chapter 14.

REVIEW IN BRIEF

- The repeal of *Glass-Steagall*, which occurred via the Gramm-Leach-Bliley Act in 1999, permits banks, securities firms, and insurance companies to affiliate within a new financial holding company structure.
- In dealing in money market paper, dealers may wear one of two hats, *agent* or *principal*. When a dealer puts on its hat as *principal*, this means that the dealer is buying for and selling from its own position, as opposed to acting as agent and simply executing customer orders with others acting as the counterparty.

- Dealers earn profits from various, often interrelated, activities: agent fees, trading, doing customer business, positioning, carry (when it's positive), arbitrage, the sale of proprietary products, clearing, investment advisory services, financing services, securities lending, and so on.
- The typical dealer is running a highly leveraged operation, much of it financed with repo.
- If, on the settlement date of a trade, a seller does not make timely delivery of the securities purchased, delivers the wrong securities, or fails in some other way to deliver in proper form, the trade becomes a fail.
- In recent years, the amount of fails has increased sharply, from an average of \$3.8 billion per day between mid-1990 and September 5, 2001, to as much as \$232 billion per day in the summer of 2003.
- The key rate in the money market is the fed funds rate. Thus, when a dealer positions, it does so on the basis of a strongly held view with respect to where the fed funds rate is headed.
- Arbitrage is another activity from which dealers seek to develop consistent profits.
- Money market dealers think a great deal about *relative* value when they decide to position.
- At the heart of a dealer's trading operation is its position manager, who is invariably a highly savvy Street person, a group of specialized traders, and a sales force that contacts retail.
- Communications play a vital role in the money market, connecting participants throughout the world.
- Information, analytics, and trading systems such as Bloomberg are widely used in the fixed-income community, providing an array of tools for professionals.

The Investors: Running a Short-Term Portfolio

Money market investors include a wide range of institutions: commercial banks, savings and loan associations, insurance companies of all sorts, pension funds, savings banks, other financial institutions, federal agencies, nonfinancial corporations, international financial institutions (such as the World Bank), foreign central banks (such as the Bank of China and the Bank of Japan), and foreign firms—financial and nonfinancial. Also, individual investors make forays into the money market, particularly via banking products such as time and savings deposits, where households had placed \$4.9 trillion of assets as of the end of June 2006.

One might expect most institutional portfolios to be managed with considerable sophistication, and the proliferation of computer modeling has made this even more possible, but “the startling thing you would find, if you were to wander around the country talking to short-term portfolio managers, is the basic underutilization of the portfolio.” These were the words of the sales manager of the government department in one of the nation’s top banks. Another dealer described portfolio management practices similarly but in slightly different terms: “Most portfolio managers would describe themselves as ‘conservative,’ by which they mean that the correct way to manage a portfolio is to look to your accounting risk and reduce that to zero. The opportunities thereby forgone are either ignored or more frequently not even perceived.” Many short-term portfolios are not managed as well as they could be, and some are not managed at all. Before we talk about that, let’s look first at how a liquidity portfolio should be managed.

CONTRAST OF A PORTFOLIO MANAGER WITH A DEALER

In Chapter 10, we note that dealers benefit greatly over time from well-chosen position plays and that a crucial ingredient in a successful dealer operation is therefore the ability to manage a highly leveraged portfolio well.

Much of what we say in Chapter 10 about how a good dealer manages his portfolio applies to bank and corporate portfolio managers as well. There are, however, important differences in perspective between the two. First, a dealer is likely to be *much* less risk-averse than the typical manager of a liquidity portfolio because it is the dealer's job to speculate on yield and yield spreads, whereas the portfolio manager's job is first to ensure that the funds he invests will be available whenever his firm needs them and only second to maximize the return he earns on these funds. A second difference in perspective is that, whereas the portfolio manager has free funds that he has to invest, the dealer has no such funds, and his decision to invest is therefore always based on a view of the market and the trading flows that he expects to see from his customers. A third difference in perspective is the time horizon. A dealer often buys securities on the expectation that he will be able to resell them at a higher price within a few minutes, hours, or days. The portfolio manager, in contrast, is normally looking for instruments that he would be comfortable holding for some longer period—how long depends on the type of portfolio he is running.

THE PARAMETERS

A liquidity portfolio is always managed within certain investment *parameters* that establish limits with respect to: (1) the types of instruments the portfolio may buy; (2) the percentage of the portfolio that may be invested in any one of these instruments (in T-bills the limit might be 100%, whereas in BAs or secondary loans, which are less liquid, it might be much lower); (3) the kind of exposure to names and credit risk the portfolio may assume (which banks' paper and which issuers' commercial paper it may buy and how much of each name it may buy, for example); (4) whether the portfolio may invest in international securities; (5) how far out on the maturity spectrum the portfolio may extend; (6) whether the

portfolio may short securities or repo securities; (7) whether the portfolio may use futures, options, or other derivatives; and (8) whether the portfolio may take foreign-exchange risk or must always hedge.

To assist in judging whether a portfolio is meeting these parameters, most large fixed-income portfolios compare their portfolios to that of a major fixed-income index such as the Lehman U.S. Aggregate Index. Indeed, Lehman claims that over 90% of U.S. investors use one or more of its fixed-income benchmarks to assist in analyzing their portfolios. Fixed-income managers use the indices largely to compare how their portfolios are constructed and to compare performance. The indices are an important resource for portfolio managers that help them in sticking to the parameters that are supposed to guide their investment decisions. The indices are also an important resource for investors, who can compare the way in which a portfolio performs relative to its benchmark and the types of risks that the portfolio is taking relative to the benchmark.

The Lehman Brothers Global Family of Indices was first launched in 1973 with the creation of its U.S. Government and U.S. Credit Indices. Its family of indices has grown into seven flagship indices, 69 macro, and over 10,000 standard and customized subindices representing more than 55,000 securities and more than \$28 trillion in assets. The continued growth of the family of indices is multidirectional, occurring simultaneously at both a stand-alone index and macro index level. At the stand-alone level, indices are created as single benchmarks to fill measurement voids for specific asset classes or geographic regions; they have rules that best capture that market. As these indices mature and grow in both scale and scope, they are often integrated into existing macro indices as they become relevant choices in portfolio construction and allocation decisions for global fixed-income investors.

The Lehman aggregate index dates back about 20 years and is composed of a wide variety of fixed-income securities including government, mortgage-backed, corporate, and asset-backed securities. The Lehman aggregate index, which is the world's largest credit index, is a market capitalization-weighted index, which is to say that the securities in the index are weighted to the market size of each segment of the bond market. About 7,000 securities were recently included in the Lehman aggregate, although the volume traded in some of these issues was often sparse. All of Lehman's indices are rules-based, meaning that inclusion in a Lehman Brothers index depends on satisfying clearly prespecified criteria.

In 2005, the average maturity for securities in the Lehman aggregate was 7.5 years.

Bond indices help top management to set investment parameters within which every liquidity portfolio operates. Because senior managers delineate the portfolio manager's playing field and thereby the kinds of winnings—return on investment—that he may seek to earn through managing the portfolio, it is important that management take time to learn what the game is about before establishing such guidelines. Additional input in this decision should be an evaluation of the kind of money that the firm is likely to have to invest for the short term: How big is the amount likely to be? How variable will it be? A third important input is the firm's management style. There are swinging corporations and there are very conservative corporations, and that difference should be reflected in their styles of portfolio management. A fourth factor is the caliber of the personnel the firm hires to manage its short-term portfolio. The more qualified they are, the wider guidelines should be set and the greater the latitude the portfolio manager should be given to exercise judgment.

MANAGING A LIQUIDITY PORTFOLIO

In large institutions, a portfolio manager is often given several portfolios to manage—one for the firm itself, another for its financing subsidiary, still others for self-insurance funds, and so forth. With respect to each portfolio, the manager must ask: What are the size, variability, and predictability of the money I am investing? The answer obviously depends in part on the purpose for which the funds are held. For example, the short-term portfolio of a manufacturing firm that experiences big seasonal fluctuations in cash flows—as auto firms and food packers do—will be more variable and less predictable in size than a portfolio supporting a self-insurance fund. A second element in the portfolio manager's evaluation of the sort of money he is investing is the cash forecasts the firm gives him—their frequency, the periods for which they are available (these might be tomorrow, the next week, the next month, and the current quarter), and the confidence that experience suggests he can place in these forecasts. The portfolio manager's assessment of the sort of money he is investing tells him how long he is likely to be able to hold securities he buys and thus the planning horizon—30 days, 90 days, 1 year, or longer—on which he should base investment decisions.

Relative Value

Once he has determined his planning horizon, the portfolio manager asks, just as a dealer does: *Where is relative value?* Answering this question requires knowledge, experience, and a feel for the market.

On a purely technical level, the portfolio manager must first face the problem that yields on money market instruments are not always quoted on comparable bases. The problem is not just that yields on discount securities are quoted on a discount basis whereas yields on interest-bearing instruments are quoted on another basis. There are also all sorts of other anomalies with respect to how interest accrues, how often it is paid, whether the security is U.S. or Canadian (Canadian CDs trade on a 365-day per year basis, domestic CDs on a 360-day per year basis), whether it is a leap year, whether a security happens to mature on a holiday, and other factors. Often, these anomalies are not reflected in the yield to maturity figures on dealers' quote sheets.¹

A number of portfolio managers, who run such large sums of money that the cost is justified, utilize sophisticated computer programs that permit them to calculate yields on a wide range of securities on a comparable basis. These programs are particularly important in the mortgage market, where many firms employ mathematicians to handle the heavy workload. One such portfolio manager noted with respect to some of the relatively simpler calculations, "I developed a program that incorporated a day algorithm that I got from a mathematician. I wanted the computer to know when a weekend occurs and to skip it in evaluating yield on a Friday trade I do for regular settlement. I also wanted the computer to recognize that in agencies July 31 is a nonday [no interest accrues], that February 29 exists whether or not it actually does, and so too does February 30; there's an arbitrage from February 28 to March 1 in agencies, and I want the computer to recognize this. The computer also knows a Canadian security from a U.S. security."

In evaluating the relative value of different instruments, being able to calculate their yields on a comparable basis is just a starting point. In addition, the portfolio manager must have a good feel for the *liquidity* of different instruments, under both prevailing market conditions and those he foresees might occur. This can involve subtle distinctions.

¹ See Marcia Stigum and Frank Robinson, *Money Market & Bond Calculations* (New York: McGraw-Hill, 1996).

The manager of a large portfolio commented, “I buy only direct issue [commercial] paper that I know I can sell to the dealers. It’s a question of liquidity, not quality. Also, I buy paper from dealers only if they are ready to take it back.”

To determine relative value among different instruments, the portfolio manager must also have a good feel for *yield spreads*: what they are, and how and why they change. This too involves subtleties. Here’s an example of one investor’s thinking at one point: “Lately, the 6-month bill has been trading way above fed funds. I ask, ‘Why?’ The technical condition of the market has been excellent with little supply on the Street [in dealers’ hands]. So the 6-month bill should have done better, but it didn’t. The reason is that we’ve got a pure dealer market. The retail buyer, who is scared and going short, is simply not there.” An environment such as this prevailed in late 2005 and early 2006 when investors were unsure about when the Fed might end its interest rate hikes. Other examples include the Asian financial crisis in 1998 when yield spreads fluctuated wildly between Treasuries and other segments of the bond market, as well as between Treasuries of varying degrees of liquidity, despite their equal credit quality.

Finally, to determine where relative value lies among different *maturity* sectors of the market, the portfolio manager must explicitly predict interest rates *and* the slope of the yield curve over at least the time span of his planning horizon. Such predictions will, as noted in Chapter 9, be based on a wide range of factors, including a careful monitoring of the outlook on monetary policy and the economic condition underlying the Fed outlook.

Relative value, in addition to depending on all the factors we enumerate, may also depend partly on the temperament of the portfolio manager—whether he has the psychology of a trader, as some do, or whether he is more inclined to make a reasoned bet and let it stand for some time.

As one investor noted, it makes a difference, “The 3-month bill will, except in very tight markets, trade at yield levels close to the corresponding long issue, which is the 6-month bill. So if you are looking for the most return for your dollar on a buy-and-hold strategy, you buy the 3-month bill and ride it for three months. If, however, you want to trade the portfolio—to buy something with the idea that its price will rise—you are better off staying in the active issue, which would be the 6-month bill.”

Credit Risk

Most companies, when they have money and are trying to increase yield, will start reaching out on the credit spectrum—buying A-2 or P-2 paper.² A few do so in an intelligent and reasoned way, devoting considerable resources to searching out companies that are candidates for an upgrading of their credit rating to A-1 or P-1 and whose paper thus offers more relative value than that of A-1 and P-1 issuers. Some companies will dabble in low-grade municipals, foreign bonds, and government agency securities. A fair number of money market funds in fact include many of these types of securities in their portfolios.

The average firm, however, would probably be well advised not to take this route. As the sales manager of one dealership noted, “We tell a company doing this, ‘It’s the wrong thing for you to do because you do not know how to do it. You have no ability to track these companies. Also, their financial statements are not worth much, and you of all people should know this because you know what you do to your own.’ They sort of look at us with jaundiced eyes, and say, ‘Oh, yes, I guess that’s so.’”

Some of the ablest portfolio managers tend to steer clear of credit analysis. As one commented, “We are not interested in owning anything that does not have unimpeachable credit because, on an instrument that does not, credit will tend to dominate the performance of the instrument more than interest rates.”

The exception to this attitude is most often found in portfolio managers working for insurance companies. They are a different breed—far more comfortable than most with credit exposure. This is an offshoot of their purchases of long corporate bonds. Indeed, at the end of the third quarter of 2005, life insurance companies held \$1.8 trillion of corporate bonds, roughly 42% of the industry’s \$4.35 trillion in assets. Because of these purchases, portfolio managers at insurance companies follow many corporate credits, and, consequently, can and do knowledgeably buy a lesser-grade commercial paper that other portfolio managers wouldn’t touch.

Portfolio managers face many choices with respect to what type of fixed-income security they should buy. The decision often rests on expectations regarding the economy and hence the outlook for monetary policy.

² Commercial paper, as noted in Chapter 23, is rated by several rating services. A-2 and P-2 paper are a grade off top-rated A-1 or P-1 paper.

For example, during periods when the Federal Reserve was lowering interest rates, credit spreads tended to tighten. In such an environment, corporate bonds are attractive. Such was the case following the Fed's interest rate cuts in 2001–2003, a period marked by a considerable tightening of credit spreads.

Maturity Choice

While a good portfolio manager can, as many do, refuse to get into credit analysis, he *cannot* avoid making explicit interest-rate predictions and basing his maturity choices on them. As one portfolio manager pointed out, “The mistake many people make is to think that they do not have to make a forecast. But buying a 90-day bill and holding it to maturity *is* making a forecast. If you think that rates are going to move up sharply and soon, you should be sitting in overnight repo; and then when rates move up, you buy the 90-day bill.”

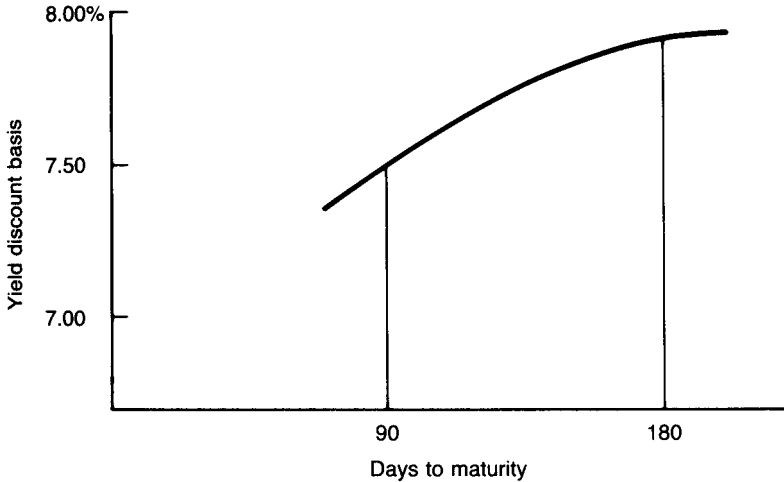
Making rate predictions is important not only because an implicit rate prediction underlies every maturity choice a portfolio manager makes, but because good portfolio managers feel as a group that the way yield on a large portfolio can most effectively be increased is by being positioned correctly along the maturity spectrum: by recognizing which maturity sectors of the market are cheap (have relative value) and which are expensive, and by buying or selling accordingly.

Riding the Yield Curve

The best way to illustrate the kind of dividends yielded by maturity choices based on an explicit prediction of how interest rates might move is with a few examples. Let's start by illustrating how a technique commonly used to raise return—namely, *riding the yield curve*—must be based on an explicit prediction of how short-term rates might change. Riding the yield curve is a strategy to increase return when the yield curve is positively sloped; it calls for buying a security out on the shoulder of the yield curve and holding that security until it can be sold at a gain because its current maturity has fallen and the yield at which it trades has consequently decreased. This strategy was deployed by many portfolio managers when the yield curve became steeper following the interest-rate cuts of the early 2000s. The main threats to the success of such a strategy are (1) that short-term rates might rise across the board and (2) that the yield curve might invert at the short end. These threats came to bear on the bond market in 2004 when the yield curve began to flatten and eventually

FIGURE 11.1

Yield curve in an example of riding the yield curve



inverted in response to the Fed's interest-rate hikes, which began in June 2004. This eliminated the allure of riding the yield curve.

Assume that an investor has funds to invest for three months. The 6-month (180-day) bill is trading at 7.90, and the 3-month (90-day) bill is trading at 7.50 (Figure 11.1). The alternatives the investor is choosing between are: (1) to buy the 90-day bill and mature it and (2) to buy the 6-month bill and sell it three months hence. To assess the relative merits of these two strategies, the investor does a *break-even analysis*.

On \$1 million of bills, a 90-day bp (a basis point earned for 90 days) is worth \$25.³ If the investor bought the 6-month bill, he would earn

³The formula used is:

$$D = \left(\frac{d \times t}{360} \right) (\$1,000,000)$$

The calculation is as follows:

$$\left(\frac{0.0001 \times 90}{360} \right) (\$1,000,000) = \$25$$

40 bp more than if he bought the 3-month bill. Thus, he could sell out the 6-month bill after three months at a rate 40 bp above the rate at which he bought it, that is, at 8.30, and still earn as many *dollars* on his investment as he would have if he had bought and matured the 3-month bill (Table 11.1). Therefore, the rate on the 3-month bill three months hence would have to rise above 8.30 before holding the 6-month bill for three months would pay out fewer dollars than buying and maturing the 3-month bill.

How likely is this to occur? Because of the slope of the yield curve (a 40-bp drop between the 6-month and 3-month bill rates), the rate at which the 3-month bill trades three months hence would be 7.50 if no change occurred in interest rates, that is, 80 bp below the break-even rate of 8.30. Thus, the investor has 80 bp of protection, and the question he must ask is: How likely is it that the Fed will tighten in the next three months so sharply that yield on the 3-month bill will rise 80 bp from 7.50 to 8.30? If his answer is that it is highly unlikely, then he would buy the 6-month bill and ride the yield curve.

Note that if the investor buys the 3-month bill and matures it, he will earn \$18,750 on each \$1 million of bills he buys (Table 11.1). If, alternatively, he opts to ride the yield curve and does so successfully (i.e., buys the 6-month bill and is able, because the Fed does not tighten, to sell

TABLE 11.1

Dollar calculations of return in example of riding the yield curve

I. Buy \$1 million of 90-day bills at 7.50% and hold to maturity.			
Face value	\$1,000,000	Discount at purchase	\$18,750
– Purchase price	981,250	– Discount at maturity	0
Return	\$ 18,750	Return	\$18,750
II. Buy \$1 million of 180-day bills at 7.90% and sell at break-even yield of 8.30%.			
Sale price	\$979,250	Discount at purchase	\$39,500
– Purchase price	960,500	– Discount at sale	20,750
Return	\$ 18,750	Return	\$18,750
III. Buy \$1 million of 180-day bills at 7.90% and sell at 7.50%.			
Sale price	\$981,250	Discount at purchase	\$39,500
– Purchase price	960,500	– Discount at sale	18,750
Return	\$ 20,750	Return	\$20,750

out at 7.50), he will earn \$20,750, which exceeds \$18,750 by \$2,000. This \$2,000 equals the extra 80 90-day bp he earns: 40 because the 6-month bill is bought at a 40-bp spread to the 3-month bill and 40 because he is able to sell it three months later at a rate 40 bp below the rate at which he bought it.

Actually, the investor riding the yield curve in our example has more protection than we indicate. The reason is that, when he buys the 6-month bill, he invests fewer dollars than when he buys the 3-month bill. So on a *simple interest basis*, he would earn an annualized return of 7.75 if he bought and matured the 3-month bill, whereas if he bought the 6-month bill at 7.90 and sold it at the break-even level of 8.30, he would earn an annualized return, again on a simple interest, 365-day-year basis, of 7.92, which is greater.⁴ To earn an annualized return of only 7.75 on the funds invested in the 6-month bill, the investor would have to sell it out after three months at a discount of 8.46, which is 96 bp above 7.50. The first break-even calculation we made on a dollar-return basis is easier, but the second, more accurate.

Another Maturity Decision

Here's a second example of how a conscious prediction of interest rates over the investor's time horizon can help an investor increase yield. The example is dated; the point it makes is *not*. When it appears that the Fed might tighten, the reaction of many portfolio managers is to retreat in panic to the base of the yield curve. Whether doing so is wise depends on the opportunities available and on how fast and how far the Fed is likely to tighten.

In April 1977, it was felt that the Fed was tightening (we say "felt" because in those days, the Fed did not announce its rate hikes; the Fed altered rates by adjusting the amount of money in the banking system). Funds were trading at 4¾ at that time and no one was sure where the rate was going. It was the feeling in the market that a ¾-point move was needed and that 5½ would probably be the top side, but some in the market suggested 5¾. Just prior to this period, 6-month BAs had risen in yield

⁴ The formula for return (in decimal form) is:

(Annualized return on a simple interest basis)

$$= \left(\frac{\text{Dollar return}}{\text{Principal invested}} \right) \div \left(\frac{\text{Days held}}{365} \right)$$

from 5.20 to 5.85 because of a lack of demand on the part of investors; the yield on 3-month BAs was 5.45. At this point, a portfolio manager with 3-month money to invest faced a choice. One alternative, assuming he was managing an S&L portfolio, would have been to adopt the bearish strategy of selling overnight fed funds in anticipation of eventually getting a $5\frac{1}{2}\%$ overnight rate.⁵ Alternatively, he could have decided to buy 6-month BAs and sell them after three months.

Using the same sort of break-even analysis illustrated in the previous example, one investor facing this choice concluded that if he bought 6-month BAs at 5.85, he could after 90 days sell them at 6.30 and do as well as he would have if he had invested in overnight fed funds and the fed funds rate had in fact immediately moved to $5\frac{1}{2}\%$.⁶ In other words, he could sell 6-month BAs three months hence at 85 bp above the rate at which 3-month BAs were then trading and still earn as many dollars as he would have by rolling funds overnight at $5\frac{1}{2}\%$. That 85 bp protection seemed more than sufficient, so he bought the 6-month BAs. As things turned out, the Fed's target for funds was only $5\frac{1}{4}-\frac{3}{8}\%$, so the BAs were by far the better investment. An investor who did not use this analysis would have missed this opportunity.

Asymmetric Positions of the Investor and the Issuer

The two maturity-choice examples we worked through involved a choice between riding the yield curve and making an alternative investment: in one case buying and maturing the 3-month bill and in the other case rolling overnight funds.

With respect to riding the yield curve, note that a bank or S&L issuing CDs or a firm issuing commercial paper is playing precisely the opposite ball game from the investor—one is trying to minimize interest paid, the other to maximize interest earned. If the issuer of paper finds that, from a cost point of view, it makes sense to roll 3-month paper, then the investor should be buying 6-month paper and holding it for three months rather than rolling 3-month paper.

⁵ The alternative facing a corporate portfolio manager would have been to invest in overnight repo or in overnight Eurodollars.

⁶ The calculation assumes that the same number of dollars would have been invested in both instruments. It also allows for the fact that an investor selling funds gets daily compounding of interest. The funds rate is quoted on a 360-day per year basis.

Stability of Return

As one good portfolio manager after another will note, “Real money is to be made by positioning correctly along the maturity spectrum—by making conscious market judgments and acting on them.”

Such positioning does not, however, guarantee *steady* high return. One reason is that sometimes the portfolio manager will be wrong in his rate predictions. A second reason is well described by one manager: “If you can invest out to two years and you feel strongly that rates are going to fall, you might choose to have an average 9- or 12-month maturity—not everything out in the longer spectrum. If you are correct and the market rallies, the proper response is to shorten the portfolio—not just to sit there and hold this apparent book yield, but to recognize it. The reason you sell is that the market eventually gets to a point where you think it has reached a peak and might go lower. If after you sell you decide that you were wrong and believe—on the basis of a new rate forecast—that rates are likely to go still lower, you buy in again long term.”

It’s sometimes difficult to produce a stable income pattern with this sort of portfolio management, and it would thus be criticized by some. After all, predicting the direction of interest rates is a difficult task. But the basic assumption is that the firm has a sustainable business model that will allow it to take chances and potentially boost returns. Therefore, the portfolio manager’s primary goal should be long-term profitability, not stability of income.

In this respect, the track record of the liquidity portfolio for organization’s such as the World Bank are interesting. The World Bank, which in early 2006 was managing \$45 billion to \$50 billion in global fixed-income liquidity portfolios, has constantly been making maturity choices of the sort described above for many years. The World Bank is known to have earned high rates of return over the years, although the monthly fluctuations in its returns were relatively high.⁷ These fluctuations were the result of a strategy of combining interest-rate forecasting, sector rotation, and arbitrage. The World Bank’s solid track record suggests, in evaluating the performance of a managed portfolio, that monthly figures are meaningless. A portfolio manager needs to look at the average record for a much longer period to get a true feel for actual performance.

⁷ Today, the World Bank is still regarded as tops in managing a liquidity portfolio.

Time Horizon and Maturity of Securities Purchased

In our example of why the return on a managed portfolio is likely to fluctuate from month to month, the portfolio manager—believing that rates were likely to fall—might well have extended maturity into the two-year area. Such an extension need not imply that either the portfolio manager’s planning horizon or his interest-rate forecast extends anywhere near two years. It simply implies that he is confident that rates will fall over some shorter period and that he is willing to sell and realize his gain once rates fall.

A few managers of short-term portfolios, who have wide parameters, even buy Treasury notes and other longer-term instruments in the hope of realizing short-term gains. Said an ex-portfolio manager, “If I liked the market, I’d buy a 10-year note even if I needed the money tomorrow.” That’s an extreme example, but this portfolio manager had the inborn instincts of a successful Street trader, which he eventually became. Some portfolios will explicitly state that they might frequently own longer-term instruments with the objective of trying to boost returns, albeit by taking added risks.

Changing Relative Value

The search for relative value is not a one-time affair. The money market is dynamic; changes in demand, supply, expectations, and external events—changes in tax laws, volatility in the foreign exchange market, geopolitical events, the behavior of world stock markets, and hedge funds woes—can at times affect the market; and, as they do, yield spreads and rates change. Thus, relative value may reside in one sector today, and in another tomorrow.

Tracking changes in relative value takes time and effort, but, as a portfolio manager gains experience, it becomes almost second nature. Also, a portfolio manager can rely on the dealers for help. Once a portfolio manager recognizes that a change in relative value has occurred between instruments or maturity sectors, his response should be to *swap* or *arbitrage*.

As one portfolio manager with wide parameters observed, “Arbitraging a portfolio is one way to make money, whether it’s a complete arbitrage or a swap between sectors of the market. Money market instruments oscillate

in relative value for good reasons; and as you get experienced, you can with not too much time keep asking why one sector of the market is out of line with where it should be—the latter judgment being more than an extrapolation of a historical average. Once you have convinced yourself that the reason is transitory, then not to own the instrument that is undervalued and be short in the other instrument that is out of line is foolhardy.”

Relative value can change rather quickly in the bond market. Consider how the Treasury yield curve behaved in 2000. In the early part of 2000, the Fed was in the midst of raising interest rates, a campaign that it began in June 1999 and didn’t finish until May 2000. When it did finish, the yield curve, which had inverted by early 2000, began to steepen, making the short end relatively attractive compared to the long end, which had been favored throughout the rate hike campaign. Interestingly, the yield on the 2-year T-note peaked just two days after the Fed’s final rate hike on May 16, 2000, after having climbed over 3 percentage points between 1998 and 2000.

Extension Swaps

We discuss various arbitrage strategies in Chapter 10. One simple swap strategy many portfolio managers use, when markets are calm, is to do *extension swaps*. They pick a maturity sector of the market they like, say 2- or 3-year governments, and then, for example, adopt the strategy of *extending* (lengthening maturity) a few months whenever they can pick up 5 bp and of *backing up* (shortening maturity) a few months whenever that costs only 3 bp. If market conditions are such that many such swaps can be done, a portfolio manager can pick up basis points this way. Note that, whereas a 90-day bp is worth only \$25 per \$1 million, a 3-year bp is worth \$300.⁸

A similar practice used by some investors in bills to pick up basis points is to roll the current 3-month or 6-month bill each week when new bills are auctioned. If conditions are such that new bill issues, which the market must absorb, are priced in the auction cheaply relative to surrounding issues, then by rolling his bills, the investor may be able to pick up two or three \$25 or \$50 bp each week. A second advantage of

⁸ The calculation is:

$$3 \times 0.0001 \times \$1,000,000 = \$300$$

this strategy is that it keeps the investor in current bills, which are more liquid than off-the-run issues.

Like a dealer, a portfolio manager can repo securities he owns.⁹ If the portfolio is that of a fair-sized bank, the portfolio manager will probably be able to repo securities directly with retail customers. If, alternatively, the portfolio is that of a corporation or other institution that does not have direct contact with suppliers of repo money, the portfolio manager can always repo his securities with the dealers, who will in turn hang them out on the other side (see Chapter 13 on matched book).

The ability to repo securities can be used by a portfolio manager in various ways. If an unanticipated, short-term need for cash arises at a time when the portfolio manager has established a position he wants to maintain, he can bridge that gap by repoing securities instead of selling them. Said one corporate portfolio manager, “We never fund to dates. We fund to market expectancy—what we think is going to happen to interest rates. We can repo the portfolio so we never have problems raising money for short periods. If we have to raise money for a long period to meet a portfolio embarrassment [securities in the portfolio can be sold only at a loss], that means we made an error and had better face up to it.”

Another way a portfolio manager with wide parameters can use the repo market imaginatively is to buy a security, finance the first part of its life with term repo, and thereby create an attractive future security. That is a technique of portfolio management, the rewards and risks of which we discuss in Chapter 10. A corporate manager can use it as well as a dealer can, and some do.

Still another way a portfolio manager can use the repo market is to out-and-out lever his portfolio—buy securities at one rate, turn around and repo them at a lower rate, and then use the funds borrowed to buy more securities. Or the portfolio manager can simply buy securities for which he has no money by doing a repo against them at the time of purchase. A portfolio manager who used this technique once commented, “I repo the portfolio as an arbitrage technique every day and probably run the biggest

⁹ Jargon in this area is confusing. Dealers talk about “doing repos” when they are financing their position and about “doing reverses” when they are taking in securities and lending money. Some portfolio managers who use repurchase agreements—just as dealers do—to lever, talk about doing repo, others talk about doing a reverse (i.e., reversing out securities). We have opted to use the word *repo* when the initiative comes from the side wanting to borrow money, and *reverse* when the initiative comes from the side wanting to lend money and/or to obtain specific collateral.

matched sale book in American industry. We repo anything we can, even corporates. In doing repo, I am either financing something I have or buying something I don't have any money for. We take the repos off for quarter ends because they might comprise the aesthetics of our statement." Avoiding repos across the quarter ends is common among those corporations that use repos, so it is difficult from looking at corporate financial statements to determine who does it.

To the corporate portfolio manager who can use repo, it is, in the words of one such manager, "the most flexible instrument in the money market. You can finance with repo, you can borrow using it, and you can ride the yield curve using it—buy a 2-month bill, put it out on repo for a month, and then sell it or do a 30-day repo again. And you can use repo to create instruments: put a 6-month bill out on a 2-month repo, and you have created a 4-month bill two months out."

Despite the many ways in which the ability to borrow in the repo market can be used, it is a strategy that many corporate short-term portfolio managers avoid, and many are not permitted to repo any of the securities in their portfolios. Many large money market funds, however, do indeed utilize repo strategies, and many explicitly state as much in the strategy overviews that they often place on their Web sites and in their prospectuses.

In large banks, the practice of repoing the government portfolio is almost universal. As noted in Chapter 6, a large bank views its government portfolio as a massive arbitrage rather than as a source of liquidity. Among smaller banks, practices with respect to the use of repo vary widely.

Arbitrages Based on a Term Repo

With respect to the use of repo by portfolio managers, a distinction should be made between portfolio managers who use the market consciously to borrow and lever, and those who are, so to speak, coaxed into doing reverses. As noted in Chapter 10, when dealers want to short securities, they will often cover their short by reversing in securities. If the security is not readily available, the dealer will go to a broker of repo who knows what securities various banks, S&Ls, and other institutions have in their portfolios. The broker will attempt to get an institution that holds the needed securities to reverse them out by showing that institution an attractive arbitrage. Such a transaction looks like an ordinary repo, but the initiative comes not from the institution that is borrowing, but from the dealer who wants to cover a short. Many banks, S&Ls, and other institutions that

would never use repo to meet a temporary cash need or to lever will reverse out securities that they intend to hold indefinitely, probably to maturity, to pick up, say, 25 bp on a short-term arbitrage, depending upon credit spreads and the shape of the yield curve. Wide credit spreads will boost the amount of pickup, as will a relatively steep curve.

Break-Even Rate on a Reverse to Maturity

Frequently an institution that holds a government note or bond in its last coupon period will find that, by swapping out of that security term fed funds or some other instrument, it can pick up 25 bp or more. On a \$1 million swap, a pickup of 25 bp is worth approximately \$1,250 if earned over six months, half as much if earned over three months. Thus, such swaps are attractive. Many institutions, however, cannot do such a swap on an outright basis if the security they want to sell is trading, because of a rise in interest rates, below the book value their accountant assigns to it.

Institutions in this situation have to resort to doing swaps indirectly. Instead of selling the maturing notes or bonds, they *reverse them out to maturity* to a dealer; that is, they borrow money against the securities. Then they invest that money in a higher-yielding instrument, often one that matches in current maturity the security being reversed out. An institution that does this type of transaction is in effect arbitraging between the low-term repo rate at which it can borrow on a collateralized basis and the higher rate at which it can invest.

Normally, a dealer who is doing a reverse to maturity will try to charge a reverse of at least a few basis points above its break-even rate. If a security's true yield to maturity, which measures the dealer's cost on the reverse, is meaningfully less than its yield to maturity, the dealer will try for more. Thus, it is worth an investor's time to calculate a dealer's *break-even reverse rate*. When a short government is sold and the proceeds are reinvested in some higher-yielding instrument, some amount of extra earnings will be picked up; how many go to the dealer and how many go to the investor will depend on where the reverse rate is set.

This point can perhaps be made with more punch by using a dollars-and-cents example. In one riskless-to-both-sides trade that a dealer made with a sleepy S&L, there was an \$8,000 profit to be divvied up. The dealer set the reverse rate so that \$5,000 went to him, and \$3,000 went to the S&L doing the arb. Had the S&L treasurer known how to calculate the dealer's break-even reverse rate, he would have been in a position to bargain for a more equitable arrangement. Probably, he could have captured

another \$3,000 of the profit to be made on the trade, leaving the dealer with \$1,000—not bad pay to the dealer for selling a security at the bid side of the market and writing a few tickets.¹⁰

Caveat

As we note in Chapter 13, a repo or a reverse always exposes both sides, the supplier of money and the supplier of collateral, to credit risk. Thus, a portfolio manager who does either transaction should check carefully both the credit of his counterparty in the trade and the way the trade is arranged. In particular, no portfolio manager should do nondelivery repo (*letter repo*) except for the short term with a top-credit-quality dealer.

Use of Futures, Options, and Swaps

Portfolio managers who may use futures, options, and interest-rate swaps find that these instruments offer an array of opportunities to lock in yields and borrowing costs, to arbitrage, to hedge, to speculate, to increase leverage, and to enhance returns. We discuss these opportunities in later chapters.

Shorting Securities

The ability to short securities can be useful to a portfolio manager in several ways. First, it permits him to arbitrage as dealers do—going long in an undervalued security and short in an overvalued security—as a speculation on a yield spread. Some corporate portfolio managers do this quite actively.

A second reason a corporate portfolio manager might want to short is because borrowing through a short seems less expensive than selling an attractive investment. Said one portfolio manager, “If we decided, yes, the market is in here [in a given maturity sector], then we would look for the cheapest thing [the instrument with most relative value] on a spread basis—Eurodollar CDs, BAs, or bills—and buy that. Even though bills might yield less than, say, Eurodollar CDs, we might buy them because the spread on Eurodollars into bills was too tight. We’d decide whether to buy or not and then buy the cheapest thing. When we decided to sell, we would

¹⁰ For an off-the-quote-sheet example that illustrates a reverse to maturity and the calculation of a dealer’s break-even reverse rate, see Stigum’s *Money Market & Bond Calculations*.

sell the most expensive thing. But we could not short so we were sort of up against it at times when we had to sell. I had already bought the cheapest thing around, so generally I had to sell something cheap. It bothered me a lot not to be able to short when we needed cash, but it might have raised questions with stockholders.”

The Big Shooters

We have drawn in this and the last chapter a distinction between dealers and portfolio managers that is perhaps too sharp. There are in the U.S. money market a number of large liquidity portfolios that take positions that rival those taken by more than one dealer, and many of those portfolios are very actively managed. The people who run them utilize every tool of portfolio management that the dealers do—from creating future securities and figuring tails to shorting in order to do arbitrages. Some also trade their positions as actively as a dealer does. Said an individual who ran one such portfolio, “I sometimes bought securities today that I knew I would have to sell for cash the next day. I might even buy if I was bullish for the next few hours—I have bought securities on the day cash was needed and sold them later in the day if I thought the market would go up a couple of 32nds.” The major differences between portfolios of this sort and a dealer operation are first that retail business is important to a dealer, and, second, that, whereas dealers are highly leveraged, a leverage ratio of 3 to 1 is highly unusual and probably top side for a standard liquidity portfolio. In a dedicated portfolio, however, leverage may, as noted below, be used extensively and routinely.

Fit the Strategies to the Times

A number of the portfolio strategies described make sense in “normal” markets when rates display some stability and predictability and when the yield curve slopes upward. There are many other times, however, when conditions can be completely different. A good example of such was in 1994 when rates rose sharply and volatility increased. In addition, the yield curve flattened sharply, and it almost inverted. The main reason for this was that the Fed had embarked on a course to tighten monetary policy by raising the fed funds rate six times and bringing it to 6.0% compared to 3.0% at the start of the year. Interest rates rose sharply in response, with the

yield on the 10-year rising from about 5% to over 8% in November 1994, when yields peaked. Some of the rate increase was the result of dislocations associated with problems in the derivatives market—particularly following large derivatives losses incurred by Orange County, California. Much of it, however, was the result of the Fed's rate increases and lingering inflation fears that had not yet been conquered following the Great Inflation of the 1970s and early 1980s. Investors surmised that with the economy rebounding, so too would inflation, just as it had in the past. Inflation never did make a comeback, making the period perhaps the most important during the Greenspan era in terms of conquering inflation fears and anchoring inflation expectations.

During 1994, riding the yield curve and tails was no longer interesting, as the flat yield curve and volatile price action reduced the allure of strategies such as riding the yield curve because there was no yield curve to ride. Instead, the more successful strategies were those that banked on capital gains associated with the likelihood of a decline in inflation expectations. In fact, 1994 contained perhaps the best opportunities for capital gains during the 1990s. It was also a good period to make bets on an eventual decline in market volatility via options and via the mortgage market.

The plays or strategies appropriate for a portfolio manager depend on market environment, which—as recent history proves—can change dramatically.

Compounding

It is a mistake when investors and borrowers ignore the impact that frequent rolling of investments or borrowings can have on the return earned or the cost incurred. When they do, especially in a period of high rates, it can be an expensive mistake, since the impact of compounding on a rate earned or paid increases not only the more often compounding occurs, but the higher the rate being compounded is.

To illustrate, suppose that the yield curve is flat at 7% from overnight to six months. If an investor opts to buy 6-month paper and roll it once, his total return over the year will be 7.12% assuming no change in interest rates. If, alternatively, he rolls overnight funds on the 255 business days that typically occur during a year, he will—again assuming no change in rates—earn a total return of 7.25%, 13 bp more than by rolling

a 6-month CD. On a \$20 million investment, this would amount to \$25,057 of extra earnings over a year.

Our simple example is not meant to suggest that interest rates, when they reach a given level, are likely to stay there for a year and that a portfolio manager should act accordingly. Rather, our intent is to illustrate the power of compounding to raise total return when rates are high and to suggest that, during such periods, the portfolio manager, in making maturity choices, should start by making benchmark calculations of the sort we did to get a feel for how compounding would affect his total return under different rate and maturity-choice scenarios.

Also, a rate of 7% is not necessary for compounding to make a difference. In an environment in which investors have many places where they can put their money, every basis point counts.

Marking to Market

In well-run short-term portfolios, it is common practice to mark the whole portfolio to market each day. The objective of running a portfolio is to maximize over time not interest accrued but *total financial return*—interest earned plus capital gains realized minus capital losses realized. If a portfolio manager who has this objective buys a 2-year note with a 4.5% coupon and then finds that yield on that note has risen to 5%, he will view his decision to have bought the 4.5% coupon as a serious mistake. Moreover, if he anticipates that rates will rise still further, he will sell that security at a loss (convert his paper loss into a realized loss) and wait to recommit long term until he thinks rates have stabilized.

The use of this tactic in portfolio management calls for willingness to book capital losses, and that willingness is a hallmark of every good portfolio manager. Realizing losses is, however, difficult to do psychologically; it is something a trader must discipline himself to do. One advantage of marking a portfolio to market each day is that it helps get the focus of those who buy and sell for the portfolio off book value. As one portfolio manager noted, “If market value declines today and you book to market, tomorrow you start at that market value. And your gain or loss will be a function of whether tomorrow’s price is better than today’s.” Said another, “If you mark to market, the past is gone. You’ve made a mistake, and the point now is not to make another one.” In other words, you are only as good (or bad) as your last trade.

Tracking Performance

Active management can substantially increase yield on a short-term portfolio. Strategies such as arbitraging sectors and changing maturities in response to interest-rate forecasts can substantially boost returns.

In an institution in which the short-term portfolio is actively managed, there are always people in top management who understand the credit market and who are therefore comfortable with creative management of the institution's portfolio. It is also the case that the focal point in management of the portfolio is on yield earned rather than on when money is needed. In other words, the portfolio manager's main concern in investing is with where relative value lies, not with when he needs cash; specifically, he does not *fund* to dates—buy 3-month bills because he needs money three months hence.

Performance in every liquidity portfolio managed to maximize return is carefully tracked. A key element in this tracking is marking the portfolio to market so that the return-earned calculation incorporates not only realized but unrealized capital gains and losses.

Once performance is tracked, it is compared to various yardsticks. A portfolio manager might, for example, compare his performance with what he could have achieved had he followed any one of several naive strategies: rolling overnight funds, rolling 3-month bills, or rolling 6-month bills. If the portfolio invests longer-term funds, the yardstick might be the yield on 2- or 3-year notes.

Another standard often used is the performance achieved by various money funds, each of which runs in effect a large-liquidity portfolio. Although information comparing money funds is widely available via services such as Morningstar or Lipper, and information for the various funds is easily found on the Internet, comparing the performance of two portfolios is difficult; one must also look at the differences in parameters: in maturity restrictions, in percentage restrictions, and in name restrictions. The two portfolios might also deploy far different strategies with respect to the use of leverage, for example. Also, differences in the time flow of funds through two portfolios may affect their relative performances.

Still another approach used in evaluating performance achieved is to compare actual results with the optimal results that could have been achieved. In other words, to ask: How high was the return we earned compared with what we could have earned if our market judgments had always been correct?

Tracking performance and comparing it to various yardsticks are important; doing so gives the portfolio manager a feel for how well he is doing. It also gives management some standard against which to evaluate his performance. This is one reason why so many managers are using fixed-income indexes such as the Lehman index (described earlier) to compare their performance.

THE STREET'S VIEW OF THE WAY IT'S DONE

We've discussed so far how not all portfolio managers who have wide latitude in what they may do and who possess the skill and judgment to make good use of that latitude manage their portfolios.¹¹

Despite the fact that many more portfolios are now actively managed, there are many liquidity portfolios—be they owned by corporations, banks, S&Ls, or other institutions—that are managed with little sophistication; perhaps it would be more correct to say they are barely managed at all. A frequent problem for these institutions is that top management has never focused on what portfolio management is all about and how it should be done. In the case of corporations, management will often adopt the attitude: we're in the business of manufacturing widgets, not investing. Having done that, they fail to apply to managing of their short-term portfolio the principles they daily apply to managing the whole corporation. Some banks and S&Ls that daily assume carefully calculated credit risks in the course of their normal business operations simultaneously run their securities portfolios according to the guiding principle: buy Treasuries and mature them. With banks holding roughly \$1.2 trillion of Treasury and agency securities as of March 2006, there are likely quite a number of banks that are guided by such a principal.

Restrictive Guidelines

When top management fails to be interested in and to have knowledge of what managing a liquidity portfolio involves, it establishes, almost invariably, extremely tight guidelines on what the portfolio manager may do; such guidelines reflect an attempt by corporate managers, who may know little about portfolio management, to be prudent.

¹¹ The World Bank portfolio is universally viewed on the Street as being aggressively and astutely managed.

Tight guidelines make it impossible for a portfolio manager to use almost any of the strategies of portfolio management discussed earlier in this chapter. Another problem with tight guidelines is that they are sometimes written in terms of amounts rather than percentages. This can make a large portfolio difficult to manage and may lead to false diversification; an extreme example is provided by a corporation that went so far as to limit the number of T-bills its portfolio could hold.

The Accounting Hang-Up

The failure of top management in some instances to understand or interest itself in the management of the liquidity portfolio also results in what might be called the *accounting hang-up*. Specifically, it has created a situation in which some portfolio managers, all of whom would describe themselves as *conservative*, believe that the correct way to manage a portfolio is to reduce their accounting risk to *zero*. In other words, they attempt to run the portfolio in such a way that they will *never* book a loss.

This means that they can take no market risk: they can't do swaps that would produce a book loss regardless of how relative value shifts; when they need cash, they can't decide what to sell on the basis of relative value; they can't arbitrage; in fact, they are literally reduced to rolling overnight money and buying securities they intend to mature; they can't utilize options; and they can't invest in lower-tiered commercial paper.

To fully appreciate how the decision never to take a loss restricts a portfolio manager, it is necessary to understand that when a portfolio acquires a discount security, such as bills, BAs, or commercial paper, each day the accountant accrues interest income on that security at the discount rate at which it was purchased. Thus when the security is redeemed at maturity for full face value, all of the difference between the purchase price and the face value (i.e., the discount at purchase) will have been accrued as interest. This seems reasonable, but it means, for example, that if a portfolio manager buys 6-month bills at 7.90 and resells them three months later at 8.30, that is, at a rate *above* that at which he bought the bills, *he will have incurred a capital loss even though in dollar terms he has earned money*. Table 11.2 spells out the mathematics of this. By buying \$1 million of the 6-month bill at 7.90 and holding it for 90 days, the portfolio has actually earned \$18,750; the \$1,000 accounting capital loss occurs only because the accountant has accrued \$19,750 of interest over the holding period.

TABLE 11.2

Accounting treatment of \$1 million of 6-month bills bought at 7.90 and sold three months later at 8.30

Book value at purchase	\$960,500
+ Interest accrued over 90 days	19,750
Book value at sale	<u>\$980,250</u>
Price at sale	\$979,250
– Book value at sale	<u>980,250</u>
Accounting capital gain (loss)	\$ (1,000)
Price at sale	\$979,250
Price at purchase	<u>960,500</u>
Actual gain	\$ 18,750

The yields and maturities in this example were purposely chosen so that they are identical with the yields and maturities used in the example of riding the yield curve presented earlier in this chapter (Table 11.1). Once these numbers are seen in the context of that example, it is clear that the unwillingness to take an accounting loss (to expose the portfolio to an accounting risk) rules out even the most basic investment strategy based on market judgment: namely, riding the yield curve. In this respect, note that in our example the portfolio manager who rode the yield curve stood to gain—if interest rates did not rise—an extra \$2,000 of return, *and* he had a lot of protection against losing in terms of dollars earned but *not* against incurring an accounting loss.

Portfolio managers preoccupied with accounting losses and gains are frequently encountered by dealers, but the dealers generally face resistance. In these cases, the portfolio managers do not care much that they could earn more money. It's an organizational issue, not a matter of rational judgment.

The whole accounting problem applies not only to discount securities, but to Eurodollar CDs and other interest-bearing securities, because the accountant accrues interest on them just as he does on discount securities; in addition, he amortizes over the time to maturity the premium on coupons purchased at a price above par and accretes over the time to maturity the discount on coupons purchased below par.

A Negative-Sum Game

The aversion to book losses and the failure to track performance that is characteristic of some institutions create a negative-sum game for the portfolio manager. If he invests on the basis of market judgment, he ends up in a position where, if his judgment is wrong, the resulting losses—even if they are losses only by accounting standards—will be highly visible and criticized. However, if his judgment is correct, the resulting gains will not be perceived by senior management.

The obvious response of the portfolio manager put in this position is to make no attempt to predict interest rates and to invest so as to avoid all market risk. If such a portfolio manager reaches for yield at all, he does so by buying P-2 paper, for example, because it offers a relatively high yield; he does not ask whether it has *relative value*. Such portfolio managers think of themselves as sophisticated because they know a lot about many different markets, *but* when they need cash three months hence, they buy a 3-month instrument instead of making a conscious market decision.

Opportunity Cost

The typical “conservative” portfolio manager thinks of himself as never having lost a penny or at least as not having lost very many, and his accountant will confirm this. But in fact an institution with a portfolio run on the principle that it funds to dates and never takes a market risk incurs a large *opportunity cost*, namely, the earnings forgone because the responsibility to manage funds in the portfolio has been abnegated. An example is provided by the example of riding the yield curve given earlier in this chapter. The portfolio manager who rides the yield curve with a lot of basis points of protection built into his gamble need not be right more than half the time to noticeably increase yield. Thus, to refuse to do so to avoid the risk of an accounting loss implies a cost, one no less real because it goes unperceived at many institutions.

There is also a more subtle aspect to opportunity cost. As one portfolio manager commented with respect to those portfolio managers who decide to buy 6-month bills and hold them to maturity on the belief that they are taking no risk because they know what they are going to earn, “That is farcical. They *are* taking a risk, one that is not measured by the accounting system but is measured in terms of opportunity cost. And the institution may in reality be affected by this risk. If rates rise

sharply and the money invested could have been used elsewhere, there is a cost to having bought those securities. Either the institution must finance them somehow or it may be forced into other sub-optimal business decisions.”

Many common portfolio practices can be pursued only at considerable opportunity cost. One is to say that, if money is needed in 30 days, cash on hand should be invested in a 30-day instrument even though predictable cash flows will more than suffice to cover that need. Another is to invest a large sum of money in short-term instruments when it is clear that most of that money will not be needed in the short run or even in the long run. A corporation that pursues such a strategy, as some triple-A credits do, pays a large premium year in and year out to ensure that it can survive even a severe credit crunch without mild discomfort.

It is sometimes suggested that the reason some large corporations do not manage their portfolios is that they have too much money; that is, it is impossible within the confines of the money market to actively manage their many billions of dollars. Sums of that magnitude are, however, actively managed; the World Bank’s multibillion-dollar portfolio is a prime example. So, too, are the actively traded portfolios of some huge money funds. Consider Fidelity’s Cash Reserves, for example, which had \$64 billion in assets as of the end of 2005. Despite its massive size, Fidelity’s fund ranked twelfth out of 298 money market funds in terms of performance over the five years ending 2005, according to Lipper Analytical Services.

As noted, there is an opportunity cost to not managing money. The counterpart is that it costs money to have someone manage a portfolio; consequently, there is some level below which benign neglect—rolling commercial paper or investing surplus cash in a money market fund—is the preferable alternative. That cutoff point is hard to pinpoint because it depends upon a wide variety of factors that are often very company specific. Whatever the amount, there are solid benefits to be reaped from having someone watch the market daily.

For the firm at the opposite pole, one with hundreds of millions of dollars to be managed in one or a number of portfolios, the optimal solution may be one that a few institutions in this position have adopted—namely, to hire a professional, give him wide guidelines, monitor his performance, and pay him on an incentive basis so that making market judgments is for him a positive-sum game. A side benefit of doing so is that the same individual can be used, as is done in many corporations, to

manage the parent's or its financing sub's commercial paper operations. Anyone who can manage a short-term portfolio well can manage a commercial paper operation equally well, since the latter is nothing but a *negative* portfolio.

Ignorance of opportunity cost and extreme risk aversion are not the only reasons why many large institutions have failed to opt for professional management of their portfolios. Another is that they would have to pay a professional money manager what a senior executive earns. A third reason is that corporations, especially if they are headquartered in outlying places, have difficulty attracting and holding Street-oriented people.

For a large corporation that wants to aggressively manage its portfolio, the commonly practiced alternative tactic of having one fast-track rookie do the job for a while and then train another to do it does not always work out. Said a portfolio manager who traveled that route, "Trading is an art form which I could not succeed in teaching my peers who had come through the system as I did. I would have done better to take on some kid hustling on the streets of Marrakesh."

THE CONTRARIAN VIEW

Our remarks above reflect strongly the Street's view of how well—or better, of how poorly—institutions manage their liquidity portfolios. In that view, there tends to be a bias in favor both of trading and of position-taking based on a view of interest rates. A contrarian case to be made is that many portfolio managers are wise to limit how much they do either of the above.

Too Harsh a Judgment?

As of June 2005, there were 7,549 commercial banks and 1,294 savings and loan institutions with a combined 92,047 offices reporting to the FDIC, and there were tens of thousands of municipal bodies, and a host of nonfinancial business firms—the majority of whom are running rather small liquidity portfolios.

In smaller institutions, it is common for the liquidity portfolio to be managed by someone who wears several hats and who, in particular, is not a money market specialist. If such a person tries to be aggressive, he runs a nonnegligible risk of getting, at some point, into deep trouble, since he will lack the time and expertise to develop a reasoned view on interest rates.

A second problem facing the small portfolio manager who is willing to be aggressive is that at least some Street salespeople are likely to advise him to try new and/or complicated products that they themselves, maybe even the Street, do not yet fully understand. In the past, a number of portfolio managers who played around with various then-new instruments—selling options on mortgage securities to take an extreme example—experienced serious financial losses because they had no inkling of the risks inherent in the new product that was sold to them. The small portfolio manager is probably well advised, because he is not a money market professional, to keep things simple and, in particular, to avoid new products until all the quirks and bugs in them are apparent from the costs—losses—that others have incurred to move up the learning curve on them.

TRENDS IN MANAGING CORPORATE LIQUIDITY PORTFOLIOS

Some savvy managers of large corporate liquidity portfolios argue that the objective that a portfolio manager who invests his firm's *working capital* is paid to pursue is to provide liquidity, safety, and yield, in that order. Thus, for such a portfolio manager to trade or to otherwise take bets with monies in such a portfolio is inappropriate. Moreover, to do so is, for the portfolio manager personally, a negative-sum game: if he makes money on his bets, his winnings may be ignored, whereas if he loses money on his bets, his losses—if large—will surely mean that someone must go; and that someone is likely to be him.

A Unified Treasury

The above is not to say that a good corporate portfolio manager thinks today that his job is to twiddle his thumbs and to invest in bills only. Major corporate investors are trying to exploit more fully opportunities open to them, but in their own way and at their own pace.

One development worthy of note is that a number of major corporations, each of which comprises a parent plus various subsidiaries, have moved to unify their treasury operations. In particular, they have moved to consolidate all short-term funds held by the parent and its subsidiaries into a single pool run out of a head office. Such pooling makes sense on several counts. First, a corporation doing so increases the professionalism with which it manages, companywide, its funds, while it simultaneously

reduces the cost of managing such funds. Second, it can more easily implement one corporate risk attitude. Third, it can diversify more easily: the pooling approach would, for example, call for just one, not many limits on DaimlerChrysler paper or on deposits at a given bank. Also, running a consolidated portfolio might permit a corporation with subsidiaries outside the United States to invest more heavily in, say, Euro commercial paper than it could if every entity within the corporation ran a separate portfolio; and that in turn would give the company the option to buy, for example, DaimlerChrysler paper in the market in which it was cheapest: the Euromarket. Finally, running a consolidated portfolio is likely to markedly reduce the transactions costs that a big corporation incurs in keeping its funds fully invested; in the money market, an institution tends, partly because of economies of scale, to get better rates and better prices the bigger the pool of money it invests.

Dedicated Portfolios

In recent years, the tendency for corporations to pool funds in a single liquidity portfolio as well as the increasing skill that corporations have developed in predicting cash inflows and disbursements have contributed to both the ability and the willingness of corporations to create *dedicated portfolios* in which they are willing to assume risk to raise yield and in which liquidity becomes a secondary consideration. Specifically, corporations have, in recent years, become more willing to carve out a portion of what they normally call their *working capital pool of funds* and dedicate that portion to more aggressive management.

More aggressive management can mean one or more of several strategies. One might be to engage in dividend capture programs. A second might be to buy, when the yield curve is upward sloping, 5-year Treasuries with the intent either to hold them only so long as the rate outlook was favorable or to hedge them as necessary. A third aggressive strategy would be to make short-term forays, unhedged, into high-yield paper denominated in a foreign currency, for example, into paper denominated in New Zealand or Aussie dollars; obviously, currency depreciation is a risk in the latter strategy, but the rewards can be handsome if the investor is not caught in a major downturn of the local currency. These are strategies frequently deployed by actively managed money market mutual funds.

Another aggressive technique some corporations have adopted is to borrow when an opportunity arises for a good arbitrage. Said one portfolio

manager who does this: “It is a fulfillment of the responsibilities that an investment manager has today to look at his opportunities not only on the asset side, but on the liability side.” Debt incurred by a corporation as part of a financial arbitrage is most typically put on the balance sheet of the parent company, but could be done on a smaller scale in, say, a finance company subsidiary.”

Corporations that borrow funds to reinvest in money market instruments are typically circumspect about the amount of such borrowing they will do. In its charter, a corporation states its business; and if it has not stated that it is in the finance business, big borrowings to do money market arbitrages might be viewed as an *ultra vires* act.

A conservative corporation might, if rates are correct, add 1% to its total borrowings in order to do money market arbitrages. Less conservative corporations are willing to borrow far more. A company that borrows to finance money market arbitrages makes this activity a profit center, rather like a bank running a Eurobook or a dealer running a book in repo and reverse. A few nonfinancial firms may be running arbitrage books into the billions. More typically, the numbers run in the hundreds of millions, and then there are the smaller players with books running at \$5 million, \$25 million, or \$50 million.

A corporation running a leveraged portfolio may borrow in various ways: from banks or by issuing domestic commercial paper, Euro commercial paper, medium-term notes, or even long-term debt. Its arbitrage might, for example, be to borrow in the Euro medium-term note market and to turn around and buy slightly weaker credits in the same market. The spread on such a transaction might be from 10 to 50 bp. Naturally, the runner of a corporate arbitrage book could match or unmatch his asset and liability maturities. As we note in later chapters, there are many ways to play the “book game.”

Another strategy a corporation doing a money market arbitrage might use would be to invest in quality credits out to five years and to source the required funds in short-term markets. This would be attractive in a period when interest rates were softening; should rates reverse direction, the corporation might dispose of its long-term assets and unwind its liabilities or it might hedge.

LET’S SEE THE NUMBERS, PLEASE

In answer to the Street’s position that corporations (and others as well) ought, across the board, to manage their liquidity funds more aggressively,

one astute corporation portfolio manager made some telling remarks: “I have watched the results of banks’ and dealers’ own trading departments, and these results have been up and down. I am not sure that, net, banks and dealers have had strong positive results over a long period. If a dealer is going to make a case for trading, he should show total rates of return that have been earned from trading over a 5-, 10-, or 15-year period: a period sufficiently long to display performance in a number of different market environments.

“People talk about their performance, but often they do not specify on what basis they calculate return earned. For dealers and portfolio managers to compare returns earned using different investment approaches, we must all speak the same tongue: use the same methodology. I don’t know if some dealer investing short term has beaten my results, but I do know that, over a 15-year period, I have beaten the results of my company’s pension fund; and it invests long-term money.”

REVIEW IN BRIEF

- Corporate portfolio managers tend to manage their money market portfolios differently from other investors. They are often more risk-averse, have fewer free funds to invest, and have a different time horizon.
- Liquidity portfolios are managed with certain investment parameters that establish limits with respect to the types of securities that their managers can invest in: their maturities, the use of futures and options, foreign investment, and so forth.
- Many portfolios utilize Lehman’s Global Family of Indices to both track their portfolio performance and compare their portfolios.
- In running a short-term portfolio, managers consider strategies that monitor relative value and credit risk, and they choose strategies such as riding the yield curve, repo, and extension swaps. They must do this while fitting their strategies to the times.
- Compounding is often overlooked, but simple calculations show that it can be an important way to add returns to a portfolio.
- Corporate managers have had a penchant for passive management over the years—at the cost of optimizing their portfolio returns.

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PART THREE

The Markets

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The Federal Funds Market

Scene: Late Wednesday afternoon on the fed funds desk of a major New York bank during the early days of electronic fed funds trading in the 1980s.

“Where is that \$150 million we bought?”

“The bank swears they sent it.”

“Then why the hell hasn’t the transfer gone through the San Francisco Fed?”

“The bank says their computer broke down. They had to deliver the transfer request by hand.”

“Is that money coming or not? Call the New York Fed! Ask them if they’ll keep the wire open or let us do an ‘as of’ tomorrow. Damn!”¹

SETTLING WITH THE FED

Wednesday afternoon settlement with the Fed creates a lot of tension for bankers, brokers, and the Fed. To understand why requires some knowledge of the rules banks follow for settling.

¹ This actual situation resulted from something happening that was *never* supposed to happen.

A wire transfer of fed funds got lost in the Fed’s computer network. The San Francisco Fed sent out the notice of the transfer of funds, but that message was not received by the New York Fed; it simply disappeared in the Fed’s switching center at Culpepper, Virginia. Later, when the Fed upgraded the Fedwire, the Culpepper switching center was eliminated. Now, district Fed banks communicate directly with one another, and redundant computer systems should make occurrences like this one a rarity indeed.

The Federal Reserve requires that all commercial banks and depository institutions maintain reserves against their liabilities in the form of deposits at the Fed. Any vault cash such institutions hold also counts as reserves.

Prior to 1984, the reserves that a bank had to maintain during the current settlement week were based on the average daily deposits it held over a seven-day period two weeks earlier. Monetarists pushed for *contemporaneous reserve accounting* on the theory that it would reduce short-term fluctuations in money supply by forcing banks to adjust their reserves and thereby their lending to their current, not their previous, deposits. This was a naive notion based on some Econ 101 text's outmoded description of banking: a bank gets a deposit, and says, "Gee, I automatically make a loan."

In real life, banks did not and do not operate that way. When loan demand was strong, money center banks adjusted their loans not to what deposits they received, but rather to the level of loans that their valued, creditworthy customers demanded of them; these banks then funded their loans, to the extent necessary, by buying money in the money market. This is a luxury that today's bankers enjoy because both the supply and the demand for money have been strong for a few years. For example, the amount of commercial and industrial loans outstanding was at a record level in the middle of 2006, having increased by about 25% from two years prior before demand began to surge. Moreover, the banking system has been highly profitable, as evidenced by the FDIC's Quarterly Banking Profile, which has shown that FDIC-insured banks earned record profits for five years straight through 2005, with earnings of \$134.2 billion that year.

In any case, at the time of the switch to contemporaneous reserve accounting, banks objected on the grounds that the switch would be operationally expensive for them and, to boot, serve no useful purpose. A second problem bankers saw with contemporaneous reserve accounting was that, while the Fed might get more current information, it might be less accurate because even a small error rate would amount to a large amount of money.

Despite bank protests, the Fed went ahead in 1984 with contemporaneous reserve accounting, some said as a sop that then Chairman Volcker felt he had to throw to the monetarists, who were at the time a vocal, in-fashion group.

Today, the reserves that a bank must maintain during the current settlement period are based on the average daily deposits it held before the

settlement period began. This has been the case since July 1998 when the Fed adopted this *lagged reserve accounting structure*. Specifically, Federal Reserve rules state that a bank's average reserves over the settlement period must equal the required percentage of its average deposits in the two-week period ending the Monday 16 days earlier. Banks receive credit (up to 4% of its required) in one two-week period for small amounts of excess reserves they held in the previous period; similarly, a small deficiency in one period may be made up with excess reserves in the following period. The carryover privilege is, however, limited to one period. A bank cannot go *red* (have a reserve deficiency) two periods in a row; and if it goes *black* (runs a reserve surplus) two periods in a row, the second period's surplus becomes excess reserves for which it gets no credit. Thus, a bank's settlements with the Fed tend over time to follow a pattern, alternating red and black settlement periods.²

For reserve calculation purposes, the reserve period begins on Thursday and ends on Wednesday. In settling with the Fed, a bank starts with a certain *required* average daily level of reserves. It need not hit its required level every day, but its average daily reserve balances over the reserve period must equal this figure.

Reserve requirements have hardly changed at all since they were set by the Monetary Control Act of 1980, when they were set at 3% on balances of up to \$25 million; and, for balances greater than that, the reserve requirement was set at 10%. In 1982, the Garn-St. Germain Act exempted the first \$2 million from reserve requirements, and this figure has been adjusted yearly according to a formula specified by the act. For 2006, the "low-reserve tranche" was \$48.3 million, and the exemption was up to \$7.8 million.³ Table 12.1 shows the reserve requirements as of May 2006.

² The 4% surplus or deficiency that a bank may carry forward equals 42% of the total reserves it must hold over the reserve period, which in turn equals the bank's required reserves multiplied by 14; this is so because a bank's "required" refers to the average balance it must maintain over a 14-day period. Thus, if a bank's required were, for example, \$1 billion, it could carry forward a reserve surplus or deficit equal to: $\$1 \text{ billion} \times 14 \times 4\% = \560 million .

³ The amount of net transaction accounts subject to a reserve requirement ratio of zero percent (the "exemption amount") is adjusted each year by statute. The exemption amount is adjusted upward by 80% of the previous year's (June 30 to June 30) rate of increase in total reservable liabilities at all depository institutions. No adjustment is made in the event of a decrease in such liabilities.

TABLE 12.1**Reserve requirements**

Type of Liability	Requirement	
	Percentage of Liabilities	Effective Date
Net transaction accounts ^a		
\$0 to \$7.8 million ^b	0	12/22/05
More than \$7.8 million to \$48.3 million ^c	3	12/22/05
More than \$48.3 million	10	12/22/05
Nonpersonal time deposits	0	12/27/90
Eurocurrency liabilities	0	12/27/90

^a Total transaction accounts consist of demand deposits, automatic transfer service (ATS) accounts, NOW accounts, share draft accounts, telephone or preauthorized transfer accounts, ineligible bankers' acceptances, and obligations issued by affiliates maturing in seven days or less. Net transaction accounts are total transaction accounts less amounts due from other depository institutions and less cash items in the process of collection. For a more detailed description of these deposit types, see Form FR 2900.

^b The amount of net transaction accounts subject to a reserve requirement ratio of zero percent (the "exemption amount") is adjusted each year by statute. The exemption amount is adjusted upward by 80% of the previous year's (June 30 to June 30) rate of increase in total reservable liabilities at all depository institutions. No adjustment is made in the event of a decrease in such liabilities.

^c The amount of net transaction accounts subject to a reserve requirement ratio of 3% is the "low-reserve tranche." By statute, the upper limit of the low-reserve tranche is adjusted each year by 80% of the previous year's (June 30 to June 30) rate of increase or decrease in net transaction accounts held by all depository institutions.

Source: Federal Reserve

The Fedwire Funds Transfer Service

The operation of the fed funds market and related activities requires literally hundreds of thousands of transfers of dollars daily among thousands of banks and other depository institutions. Indeed, in the fourth quarter of 2005, the Federal Reserve's so-called Fedwire Funds Service system processed an average of 544,000 transfers daily totaling an average of \$2.167 trillion per day. This is possible in large part because of the Fedwire system. Under this system, an individual bank is linked electronically to its district Federal Reserve Bank, which in turn is linked to every other district Fed bank. In early 2006 there were 9,500 participants in the Fed's Fedwire system. The Fed has certainly come a long way from when it first introduced its first dedicated funds transfer network in 1918

featuring a Morse Code system that connected the 12 District Banks, the Federal Reserve Board, and the U.S. Treasury.

According to the Fed, by using the Fedwire Funds Service, only the originating financial institution can remove funds from its Federal Reserve account and send it to another institution. Originators provide payment instructions to the Federal Reserve either online or offline. Online participants send instructions through either a mainframe or PC connection to Fedwire, and no manual processing by the Federal Reserve Banks is necessary.

For example, if the Bank of America (B of A) sold \$50 million of fed funds to Citibank in New York, it would send an electronic message to the San Francisco Fed, which would debit B of A's account and relay the payment message to the NY Fed, which would credit Citi's account and notify Citi (Table 12.2).

Offline participants give instructions to the Reserve Banks by telephone. Once the telephone request is authenticated, the Reserve Bank enters the transfer instruction into the Fedwire system for execution. The manual processing required for offline transactions makes them more costly, and thus they are suitable only for institutions with small, infrequent transfers.

The Fedwire system began to assume its present form several decades ago. Before that, even the big New York banks had to exchange checks to make payments to one another. Now, they are linked by wire to the New York Fed, and all interbank payments in New York go over

TABLE 12.2

The B of A sells Citibank N.Y. \$50 million of fed funds

Bank of America		Citibank	
Reserves	–50MM	Reserves	
Fed funds sold		+50MM	Fed funds purchased
+50MM			+50MM
San Francisco Fed		New York Fed	
	Reserves, B of A		Reserves, Citi
	–50MM		+50MM

the Fedwire. The New York Fed was in fact the first district bank to be linked by wire to member banks within its district.

Times have certainly changed; 30 years ago, the way the principal banks in St. Louis, which were across the street from the St. Louis Fed, communicated with the Fed was to walk across the street and deliver a slip of paper. Now all the Federal Reserve District banks and their branches have extended access to Fedwire to member banks. The huge volumes of transactions justify such access.

Banks use the Fedwire not only to handle their transactions in the fed funds market, but for other transactions. Each major bank has hundreds of correspondent—domestic and foreign—banks that keep accounts with it, and it keeps accounts at other banks. Throughout the day, monies are constantly being paid into and out of these accounts over the Fedwire in connection with securities transactions, collections, and so forth. In fact, in early 2006 there were over 9,100 participants in the Federal Reserve's Fedwire Securities Service, which consists of a safekeeping function and a transfer and settlement function. The safekeeping function involves the electronic storage of securities records in custody accounts. The transfer and settlement function involves the transfer of securities among parties. Transfers are initiated in the same way as the transfer of funds; they can be initiated only by participants in the Fedwire Securities Service that wish to deliver securities out of their account at the Fed. The Fed handled 88,000 such transactions on a daily basis during the fourth quarter of 2005 with a dollar value averaging \$1.4 trillion. The distribution of these data is skewed substantially by transactions at large institutions; in 2000 the median Fedwire payment was \$25,000, but the average was \$3.5 million. Additionally, 50 users accounted for over 80% of the total volume of transfers.

Also, corporations and nonbank financial institutions are constantly requesting banks to *wire-transfer* funds for them. For example, a large corporation might wire money from its account in a West Coast bank into its account at Citibank and then later in the day have those funds wired from the Citibank account to the account at Morgan of a nonbank dealer from which it had bought governments or other securities. Most of these types of transfers are done delivery-versus-payment, meaning that exchange of dollars for securities is done simultaneously by the Fed. Nevertheless, the Fed processes many thousands of wires of both money and securities. The money market, which is largely a cash-settlement

market (payment is made on the day of a trade with “good”—*immediately available*—funds), generates a huge volume of traffic on the Fedwire, as the above data show.

Reliability of Fedwire

Because of the vast number of transactions that occur daily over the Fedwire system, it is essential, if the banking system and the money market are to operate efficiently, that the Fed’s system operate efficiently, securely, and reliably for the sake of both its customers and the U.S. financial system. Fedwire has a strong history of complete availability, with availability never less than 99.85% for any given month during the period January 1997 through September 2001 (Table 12.3).

The Fedwire system was obviously put under great strain in September 2001, and its availability was reduced (Table 12.3). Nevertheless, by most accounts Fedwire held up extraordinarily well

TABLE 12.3

Fedwire funds transfer availability statistics*

Month	1997	1998	1999	2000	2001
January	99.85%	100%	100.00%	100%	100.00%
February	100.00%	100%	100.00%	100%	100.00%
March	100.00%	100%	100.00%	100%	100.00%
April	100.00%	100%	100.00%	100%	100.00%
May	100.00%	100%	99.88%	100%	99.84%
June	100.00%	100%	99.86%	100%	100.00%
July	99.92%	100%	99.93%	100%	100.00%
August	100.00%	100%	100.00%	100%	100.00%
September	100.00%	100%	100.00%	100%	97.85%
October	100.00%	100%	100.00%	100%	100.00%
November	100.00%	100%	100.00%	100%	XX.XX%
December	100.00%	100%	100.00%	100%	XX.XX%
Annual	99.98%	100%	99.97%	100%	XX.XX%

*Data through October 2001. From January 1997 through November 1997, Fedwire operated from 8:30 a.m. to 6:30 p.m. (ET), or longer if the close was extended. Beginning in December 1997, operating hours expanded to 12:30 a.m. to 6:30 p.m., or longer if the close is extended. In 2004, the opening time was expanded by 3½ hours to 9 p.m. on the preceding calendar day.

Source: Federal Reserve

considering the situation. Procedures established since then have been implemented with the goal of immediate recovery of the Fedwire system.

For example, the Fed's Reserve Banks maintain out-of-region backup facilities for Fedwire applications and all integral support and related functions. The Reserve Banks routinely test Fedwire business continuity procedures across a variety of contingency situations to ensure timely resumption of Fedwire operations in the event of a local, regional, or widespread disruption. The Fedwire applications and recovery procedures are enhanced on a continuous basis.

Three data processing centers support the Fedwire services. One site supports the primary processing environment with on-site backup. A second site serves as an active, "hot" backup facility with on-site backup. A third site serves as a "warm" backup facility. The three data processing centers are located a considerable distance from one another (i.e., hundreds of miles) in order to mitigate the effects of natural disasters, power and telecommunication outages, and other wide scale, regional disruptions. In addition, all three data processing centers have appropriate security and include various contingency features, such as redundant power feeds, environmental and emergency control systems, dual computer and network operations centers, and dual customer service centers. Both the primary and secondary processing sites for Fedwire applications include full on-site processing redundancy, whereby in the event of a disruption to the primary production environment, a separate on-site recovery environment can be automatically invoked that can immediately take over production processing. The Fedwire applications transmit and log transactions and critical database changes to an out-of-region third site in real time throughout the day. These data are stored in file format for possible intraday contingency use. Although there are adequate processing resources at the third site to support the Fedwire applications, they are not dedicated resources. In the event of either an outage at the primary or secondary site or an outage at both sites, processing resources at the third site can be preempted to support same-day recovery of the Fedwire applications. The Reserve Banks conduct from four to six on-site recovery tests and four remote-site recovery tests per year for the Fedwire services.⁴

⁴ This section was adapted from Section 7.4 of the Federal Reserve's Self-Assessment of Compliance with the Core Principles for Systemically Important Payment Systems, dated December 19, 2001.

The Fedwire system has not always been so sound. In the early 1980s, it was taxed to its limit with the result that it was often subject to “throttle,” which means that it took messages from the banks more slowly than its normal speed. From a user’s point of view, throttle was like being put on hold every time one sent a message to the Fed. In 1983, the Fed made a major upgrade of the automated system it uses to support Fedwire. Because the major banks could not tolerate a long breakdown in their computer operations, the Fed designed its internal systems so that the maximum down time for a breakdown would be limited to a few minutes or a few hours at most. Today, New York banks have added redundant systems to ensure a seamless transition in case of emergency.

Fedwire Operating Hours

The operating hours for Fedwire start at 9 p.m. [Eastern Time (ET)] on the preceding calendar day and end at 6:30 p.m. (ET), Monday through Friday. For example, on a Sunday, the Fedwire Funds Service will open at 9 p.m. (ET) with a cycle date of Monday, although transfers sent from 9 p.m. to midnight (ET) on Sunday will settle in real time on Sunday. The deadline for initiating third-party transfers (transfers initiated by a depository institution on behalf of its customers) is 6 p.m. (ET). The current opening time of 9 p.m. extends by 3½ hours the previous opening time of 12:30 a.m., which was in place until the second quarter of 2004.

Fed rules show that the core operating hours for the Fedwire Securities Service are 8:30 a.m. to 3:15 p.m. (ET), Monday through Friday, excluding designated holidays; during these hours participants can originate online securities transfers. Online participants can initiate reversal transactions until 3:30 p.m. (ET) and move (reposition) their securities among their securities accounts until 4:30 p.m. (ET) for a payment and until 7 p.m. free of payment for delivery of securities only. Offline participants can initiate securities transfers or other requests from 9 a.m. to 1:30 p.m. (ET) for same-day processing and until 4 p.m. (ET) for future-day processing. Under special circumstances, participants can ask the Federal Reserve Banks to extend the Fedwire Securities Service operating hours.

HISTORY OF THE MARKET

In 1921, some Fed member banks were borrowing at the discount window, while others had surplus reserves for which they had trouble finding an outlet

because of depressed market conditions. After informal discussion, the banks that were borrowing from the Fed began purchasing balances from the banks that had excess reserves, and the fed funds market was born.

Trading in fed funds continued throughout the 1920s but fell into disuse during the 1930s, when most banks had excess reserves for a long period. During the early 1940s, the banks purchased large amounts of the \$400 billion of new government debt issued to finance the war, and they adopted the practice of settling their reserve positions by trading short-term Treasury bills for cash settlement.

Gradually, it became clear that there was an easier way for the banks to settle—instead of selling bills among themselves, they began in the early 1950s to sell 1-day money among themselves.⁵ And as they did, the fed funds market—dormant since the 1920s—was revived. Another reason for the revival of the funds market was that, as interest rates started to rise after the Treasury-Fed accord, everyone became more conscious of the value of money left idle, and banks in particular began to see the merit in keeping their excess funds fully invested. The revival of the fed funds market was particularly attractive for retail banks with a customer base consisting largely of consumers. These banks needed an outlet for their surplus funds, and they took up the practice of selling fed funds every day to their large-city correspondents.

By 1960, these developments led to a situation in which the big New York and Chicago banks began to deliberately operate their basic money positions so that they were always short, on the grounds that they needed room to buy all the fed funds that were coming into them from smaller correspondents. This was an attractive situation for the large banks because fed funds were the cheapest money around, and they naturally asked: Why not use it for 10% of our overall needs?

In the late 1950s when the big banks sold to their correspondent banks the “service” of buying up the latter’s excess funds, the big banks said, “Of course if you ever need fed funds, we will be happy to sell them to you.” This commitment came back to haunt them in 1963 when interest rates started to take off in the aftermath of the Kennedy tax cut. By then, the smaller correspondent banks had developed an insight into the money market; they began buying Treasury bills, which were then trading

⁵ This development was fostered by Garvin Bantel (now Garvin GuyButler), a firm that once brokered call loans to brokers and was an important broker of list bonds.

at a higher yield than the discount rate, and financing them first with their own surplus funds and then by purchasing fed funds from the big banks.

At that time fed funds had *never* traded higher than the discount rate. Since banks bought fed funds only to settle their reserve positions and then only as an alternative to borrowing at the discount window, bankers feared that any bank that was willing to pay more than the discount rate for fed funds would be subject to the accusation that for some reason it could not borrow at the window.

Gradually, the situation became critical for the big banks because all their correspondents were buying T-bills at 4%, financing them with fed funds purchased at $3\frac{1}{2}\%$ (the level of the discount rate), and raking in the spread. This continued for more than a year, during which time the big banks became huge net sellers of fed funds. To fund the sale, these banks were issuing CDs at rates higher than the rate at which they were selling fed funds to their “valued” correspondents.

Something had to give. Finally, in 1964, Morgan decided that if any bank could get away with paying more than the discount rate for fed funds, it could; and on October 4 of that year, it bid 3% for funds at a time when the discount rate was $3\frac{1}{2}\%$ and funds were trading at $3\frac{1}{2}\%$. The \$500 million estimated to have been traded at this higher rate that day was a miniscule sum by today’s standards, but the gambit succeeded and began a new era in the funds market. Rapidly funds began to trade at a market rate that was determined by supply and demand and was affected by the discount rate only insofar as that rate influenced demand.

After funds began to trade at a market rate, the fed funds market mushroomed, and more and more banks got into it. Regional banks that at the inception of the market were selling funds to large banks began to operate their own regional markets. Before this development, most trading in fed funds was done in New York and Chicago, with perhaps a little in San Francisco. Small outlying banks with only a little money to sell were excluded from the market because it made no sense for a bank with \$100,000 of overnight money to sell to telephone New York when the rate it would get was 3% or $3\frac{1}{2}\%$.⁶ However, when the regional banks began to buy fed funds, it paid for a bank in Joplin, Missouri, to call St. Louis for \$0.30 to sell even \$50,000 of fed funds. In the fed funds market now, regional banks buy up funds from even tiny banks, use what they need,

⁶ At a $3\frac{1}{2}\%$ rate, \$100,000 of overnight fed funds is worth \$9.72.

and resell the remainder in round lots in the New York market. Thus, the fed funds market resembles a river with tributaries: money is collected in many places and then flows through various channels into the New York market. In essence, the nation's smaller banks are the suppliers of fed funds, and the larger bankers are the buyers.

As the fed funds market developed, some regional banks that entered it felt they were not in close enough contact with the market to call the last $\frac{1}{4}$ or $\frac{1}{8}$; they adopted the practice of asking brokers to sell or buy money for them at whatever price the brokers thought was the best available. The amount of such *discretionary money* amounted at one time to a sizable sum. Today, that money has vanished; the regionals have become much more sophisticated.

"In the days when fed funds were first traded, the market was," said one ex-trader from a large bank, "a travesty, a joke as far as being a real market. There were six or eight real decision makers in the entire market—a couple of brokers and the guys on the money desks of the top banks. When a top broker walked in on Thursday morning at the start of a new settlement week and said, 'Funds are $1\frac{1}{16}$ – $\frac{3}{4}$,' the market pretty much formed up around that. Few people would challenge that view because they knew a lot of banks had given that broker money to buy or sell at her discretion. On Broadway the *New York Times* drama critic can close a show. In every area you have opinion makers, and the fed funds market was no exception."

Controlling the Fed Fund Rate versus Controlling the Money Supply

Over time, the fed funds market had evolved considerably. Initially, fed funds traded at $\frac{1}{8}$ s of a percent; then, as more participants entered the market and it became more competitive, funds began trading at $\frac{1}{16}$ s and then at $\frac{1}{32}$ s. For a time, the Fed let the funds rate fluctuate in a wide band. Then, in the late 1960s, it began to peg that rate tightly. How tightly is indicated by a comment made years ago by a person on the Fed desk, "When we are in a period when our fed funds target is not changing, money supply is growing at a steady rate, and we are at peace with the world, we are inclined to be more relaxed about the funds rate and to let it fluctuate within a $\frac{1}{4}$ band. But in a delicate situation where we want to give signals to the market—when they are misunderstanding our posture and we want to be sure they get the message—we might narrow that spread to $\frac{1}{16}$."

All that changed in October 1979 when the Fed switched to monetarism pure and simple. At that time, the Fed decreed that the rate at which funds traded would be wherever market forces took it, which turned out to be all over the lot. Whereas in pre-1979 days a move during the day, other than Wednesday, in the fed funds rate of $\frac{1}{4}$ was unusual, intraday swings of 200, 300, even 400 bp in the rate became common after the Fed switched the primary focus of its policy from tight control of the funds rate to tight control of the rate of growth of money supply.

As noted in Chapter 9, there are good grounds for doubting whether the Fed was ever a serious convert to monetarism; more likely, it viewed a public profession of monetarism as a sort of temporary expedient. By declaring that its goal was to control money supply, the Fed was able to fight inflation by allowing interest rates to rise to market-clearing levels—levels that proved so high that they would have been politically unacceptable had not politicians, too, bought into monetarism.

Once inflation was quelled, the Fed gradually moved away from its monetarist stance. Having changed its definition of money supply as gasoline prices have increased these days—there was M1 to M5, M1A, M1B, and L—the Fed more or less admitted that, in a constantly changing world, there was no measure of money supply that it could control and, more important, no measure that it made sense, theoretically or practically, to control. The most recent example of this is the Fed's decision in March 2006 to end the reporting of M3.

There remains plenty of debate over when exactly the Fed began to target the fed funds rate. There are some who believe that the Fed's shift to rate targeting began in 1982 after the FOMC deemphasized M1 and moved to what is commonly known as a *borrowed reserve operating procedure*.⁷ Many others contend that the switch came in 1987 at the start of Alan Greenspan's nearly 19 years as Fed chairman. Still others put the date at 1992 when the New York Fed published a series on the *associated federal funds rate*, which it described as "the federal funds rate trading area that is expected to be consistent with the borrowing assumption."⁸ The point is that as recently as 1992 the Fed was still characterizing the funds rate as a consequence of its operating procedure rather than as an objective.

⁷ D. L. Thornton, "The Borrowed-Reserves Operating Procedure: Theory and Evidence," Federal Reserve Bank of St. Louis, *Review*, 1988, 70(1), pp. 30–54.

⁸ D. L. Thornton, "When Did the Federal Reserve Begin Targeting the Federal Funds Rate?" Working Paper, Federal Reserve Bank of St. Louis, August 2004, Revised May 2005.

It wasn't until February 4, 1994, on an initiative from Fed Chairman Alan Greenspan that the Fed began to announce changes it made in the fed funds rate on the day they were made. While the FOMC statement that February was clearer than previous Fed statements, it was still far less transparent than the statements we see today. Figure 12.1 shows the groundbreaking February 1994 statement and a more recent one from January 31, 2006 (additional commentary discussing the voting record of the FOMC members and the requests submitted by Reserve Banks, which were not included in 1994 but which were included at the end of the 2006 statement are omitted here for simplicity).

By targeting the fed funds rate, the Fed essentially relinquishes control of the money supply because it must supply as much money as is

FIGURE 12.1

Comparison of the Fed's policy statements

Release Date: February 4, 1994

For immediate release

Alan Greenspan, Chairman, Board of Governors of the Federal Reserve System, announced on February 4, 1994, that the Federal Open Market Committee had decided to increase slightly the degree of pressure on reserve positions. The action was expected to be associated with a small increase in short-term money market interest rates.

The decision was taken to move toward a less accommodative stance in monetary policy to sustain and enhance the economic expansion.

Chairman Greenspan decided to announce this action immediately so as to avoid any misunderstanding of the Committee's purposes, given the fact that this is the first firming of reserve market conditions by the Committee since early 1989.

Release Date: January 31, 2006

For immediate release

The Federal Open Market Committee decided today to raise its target for the federal funds rate by 25 basis points to 4½ percent.

Although recent economic data have been uneven, the expansion in economic activity appears solid. Core inflation has stayed relatively low in recent months and longer-term inflation expectations remain contained. Nevertheless, possible increases in resource utilization as well as elevated energy prices have the potential to add to inflation pressures.

The Committee judges that some further policy firming may be needed to keep the risks to the attainment of both sustainable economic growth and price stability roughly in balance. In any event, the Committee will respond to changes in economic prospects as needed to foster these objectives.

necessary to keep the fed funds rate at the target rate. If it didn't, the funds rate would drift higher or lower than the funds rate. For example, if the demand for money (by demand, we mean via loans, bank credit, bond issuance, equity issuance, commercial paper issuance, and so forth) were to increase by some large amount, say 20%, in a given year, the price of money—the fed funds rate—would probably rise if not for the Fed's injections of money into the financial system. After all, simple economics tells us that when demand outstrips supply, prices rise. The same case can be made for the price of money.

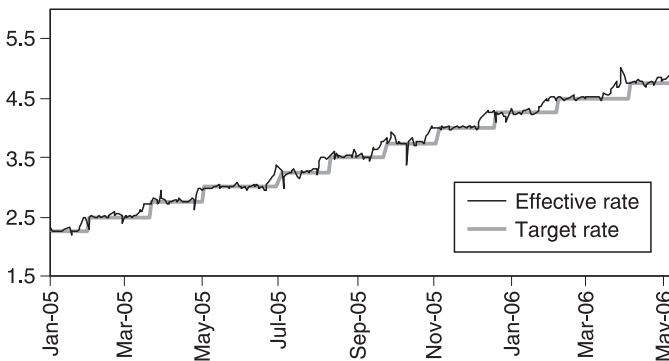
The Effective Fed Funds Rate

Time out for a definition. People often speak of the fed funds rate, but on any given day, funds trade from early morning until late afternoon; and the rate at which they trade has plenty of time to bounce around a bit. In other words, where fed funds actually trade on any given day tends to differ from the Fed's target rate. Figure 12.2 shows this. It plots the target rate versus where funds actually traded in 2005 and 2006.

To get a single number for the rate at which funds traded on a particular day, market statisticians have to construct an average rate. The average rate they use is a weighted average of the funds rates that prevailed during the day, where the weights used are the amounts of funds

FIGURE 12.2

Effective fed funds rate versus the target fed funds rate



Source: Federal Reserve

that traded at each of the funds rates that prevailed. This weighted average is called the *effective fed funds rate*. The Fed utilizes data from overnight funds traded in the brokered fed funds market to arrive at this rate. Data on the effective fed funds rate are published in the Federal Reserve's H.15 statistical release.

Fed Control over the Funds Rate

Given that there are so many players in the funds market (almost 10,000 of them), that the composition of these players and even their stance—as buyers or sellers—keep changing, and finally, that so many factors affect supply and demand in the funds market, the Fed's task of pegging the funds rate is tough.

Figure 12.2 shows that although the Fed does not hit its target with precision, it pretty much hits its target most of the time. The reasons for the improvement in the Fed's ability to control the rate at which funds trade are several: “For one thing,” said a broker, “the Fed now has better control over float. Also, the Fed now has better numbers; it clarified a lot of its forms so banks now give more meaningful and consistent numbers to the Fed than they did in the past. In addition, the Fed monitors the market more closely than it used to. We get called [by the Fed] maybe five times a day, and so too do the other brokers. During the morning call, the Fed asks us, ‘What does the market look like today? What does it expect of us today?’ The Fed also calls the money center banks and other major players in the market. Thus, the Fed has a pretty good handle on what everyone expects and on what everyone has to do [to buy or to sell].

“Years ago the head of the Open Market Desk said, ‘If you want to hang your hat on something, hang it on the average effective funds rate over the settlement period.’ That is as true now as it was then. The Fed is doing things now the same way they always did; they have not changed. People try to attribute complex motives to the Fed, but they are not there. The Fed has improved on what they do, but they do it the same way.”

The Federal Reserve is said to control the fed funds rate by adjusting the amount of reserves in the banking system. This assumes a *liquidity effect*, whereby increases in the amount of reserves are expected to result in a lower effective fed funds rate, and decreases are expected to result in a higher effective fed funds rate. Researchers disagree over whether any liquidity effect exists. Hamilton (1997) found that a significant liquidity effect occurred only on bank settlement day; Thornton (2001) questioned

whether any liquidity effect existed at all; but Carpenter and Demiralp (2004) found strong empirical support for a daily liquidity effect.⁹ At the center of the debate is the fact that the Federal Reserve does not directly affect the supply of federal funds in the financial system; it affects the supply of reserves. Thus the Fed's impact on the funds rate might be the result of endogenous as well as other factors, Thornton argues. To illustrate the point, it is notable that the Fed's daily open market operations are substantially smaller than the daily volume traded in fed funds, making its influence on the funds rate open for debate. Few would argue, however, that the Fed's reserve adjustments do indeed affect the amount of reserves in the banking system and that the banks could theoretically alter the amount of reserves that they wish to use for lending, hence imparting significant influence in the amount of fed funds in the financial system, which, in turn, affects the fed funds rate.

RUNNING A FED FUNDS DESK

The primary job of the manager of a bank's fed funds desk is to ensure (1) that the bank settles with the Fed *and* (2) that in doing so, it holds no more excess reserves than the amount, if any, that it can carry into the next week. This is a tricky job at a major bank because each day such a bank experiences huge, highly variable, and difficult-to-predict inflows and outflows of funds. These all influence the bank's balance at the Fed and so they must be carefully monitored by the desk, which at the same time is buying or selling funds as necessary to develop the balance it wants for the day at the Fed.

The flows that affect a major bank's funds position come from various sources. Its correspondents sell it huge sums of money, and sometimes they will ask to buy funds from it. Additional flows result from changes in correspondent (domestic but more especially foreign) bank deposit balances, changes in customer deposit balances (firms wiring money into and out of the bank and from ATM withdrawals), changes in the Treasury's balance in its tax and loan account, big loans coming on or going off the

⁹ J. Hamilton, "Measuring the Liquidity Effect," *American Economic Review*, March 1997, 87(1), pp. 80–97; D. Thornton, "Identifying the Liquidity Effect at the Daily Frequency," Federal Reserve Bank of St. Louis, *Review*, July/August 2001, pp. 59–78; S. Carpenter and S. Demiralp, "The Liquidity Effect in the Federal Funds Market: Evidence from Daily Open Market Operations," Finance and Economic Discussion Series, September 2004.

bank's books, purchases and sales made by the bank's portfolio and by the bank's dealer department, changes in the amount of CDs the bank has outstanding, changes in the level of repos it does, flows from and to foreign branches, and—in the case of clearing banks—fluctuations in dealer loans.

Normally, a bank's fed funds desk starts the day with a sheet on which it projects the inflows and outflows that will affect its bank's reserve account at the Fed during the day. Some, such as flows generated by maturing repo and big loans going on or off its books, are known. The rest it estimates on the basis of past experience and any additional information available. The desk *heads out* (adds up and compares) all these figures to get its first estimate of what money it will need to buy or sell during the day. Then, as the day progresses and actual inflows and outflows occur, the desk tracks these flows and their effect on the bank's balance at the Fed. This can be boring and tedious work, but it must be done if the bank is to keep a handle on its position. As one fed funds trader after another will note, the traders on the desk are only as good as their backup people. If one of these makes an error, the bank may inadvertently end up way black or way red, a situation that can create a problem on any day and a major bust on a Wednesday.

At most major banks, the fed funds desk is managed conservatively. The desk has a good idea of what average daily balance it must have to settle for the period, and it attempts each day to be within a few percentage points of that figure. One reason is that, since fed funds trade in a narrow band—except when the Fed is moving the rate, there is not much incentive to play the rates—go long on a day when funds seem cheap and short on a day when they seem expensive.

A second reason for a fed funds trader to be conservative is that her bank has only two ways to evaluate her performance: Is the bank covered? How does the average rate she paid compare with the Fed effective? No funds trader wants to hear her management say: "The effective rate was this; you had to be an idiot not to at least hit it."

Yet another reason that banks are disinclined to play around on the fed funds desk is that most of them are either big natural sellers or buyers of funds, and they work best—because of line problems—when operating from their natural stance. With few exceptions, most large banks are net buyers of funds. A bank will sell funds only to a bank to which it has extended a line and only up to the amount of that line. Thus, if a bank that is normally a net buyer of funds accumulates a big surplus position, it may have difficulty working off that surplus because it has insufficient lines to sell it.

Some state-chartered banks have an additional problem. The Comptroller of the Currency has ruled for national banks that funds purchases and sales are not to be treated as borrowings and loans for purposes of regulation. Thus, there is no legal limit on the amount of fed funds a national bank may sell to another bank. In some states, however, sales of fed funds are treated as a normal loan. In such states, a state-chartered bank can extend to another bank a line equal to only a small percentage of its capital.

A bank that cannot get rid of excess funds can always sell these funds in the repo market, that is, provide dealers with secured loans. But in doing so, it will typically get a lower rate than it would by selling funds, and it may end up selling off excess funds at a rate below that at which it purchased them from its correspondents.

Difficulties in selling excess funds can also constrain the amount by which even the largest and most well-thought-of banks can go red early in the week. Banks are behooved to remember that the sale of fed funds is an unsecured loan. As a result, banks are careful to vary their daily purchases of fed funds.

Conservative banks look to stay close, daily, to their anticipated reserve needs. Said one dealer, “If you think, at the beginning of the reserve period, that the Fed is going to do a lot of adding and that funds are going to trend down, you might borrow a little less than you otherwise would have. But at a large borrowing bank, you have such a big job to do that you cannot get far behind and hope to make it up at the end of the reserve period. It cannot be done.”

Conservative fed funds traders, while they will not try to make money by dealing aggressively in funds, attempt to do what they can for the bank’s profit and loss (P&L) statement in other ways. Said one who is typical of the breed, “We are not supposed to be a profit center. We do, however, usually make money if we sell funds or finance dealer loans. The dealer loan gives us a better spread over fed funds, and it’s a secured loan. But the real nature of our game is to buy cheaper than the effective funds rate. We make the bank money by saving it. A 16th is only \$1.74 on \$1 million, but with the amounts we borrow, 16ths can mount up.”

Dealing Aggressively

While most fed funds traders are conservative, and well advised to be so because that is what management wants, there are a few sharpshooters in the crowd. One trader of this genre, who was quite comfortable going

above or below his daily required by 50%, commented, “I don’t like to just pick up the phone and buy or sell. If I feel that there is strength in the market, I will wait to sell even if I have a lot to sell. Then in the early afternoon, there is the moment of truth. I have to make some sort of decision. You get a good sense of accomplishment when you wait and it turns out you were right. When it does not, you have to scramble. But that is part of the fun of doing it. The fun is to have a conviction and at times buy yourself long or sell yourself short.”

Said a trader who liked to play even more: “Some guys act as if they settled every night. That is what you call *a day position*. I have a different philosophy. Say I need \$100 million a day for seven days, that is, a \$700 million cumulative. If I think rates are high one day, I might buy just \$50 million and then pick up \$150 million the day after if rates are more reasonable. Also I go where the money is cheapest. If it is cheaper to buy Eurodollars, I buy Eurodollars, not fed funds. If Eurodollars are cheap, I will buy Eurodollars and sell fed funds.

“When I got this job, they tended to think that you need \$100 million a day. I said, OK, if I can get money cheap, I will buy \$200 million and sell \$100 million off at a profit and reduce my effective cost of funds. Not many people do that. I ask: How can a bank not leverage down their cost of funds by using this route? It takes extra work to buy and sell, but in the end you reduce your cost of money. Over the first quarter of this year, if I had just bought money all the time from our correspondents, as I should have, I would have had an effective cost on the \$500 million to \$1 billion, which I had to buy, that was 25 bp higher than the actual effective cost of money I achieved. And I managed that savings in a market in which you have a $1/16$ spread.

“A lot of banks look at the fed funds guy as custodian of a checking account whose prime function is to make sure that the bank does not have an overdraft at the Fed. This is where the action is, where the basic position of your bank is settled.

“Too many people are stodgy. The way I look at it, Babe Ruth only hit .342, and he was a superstar. Ty Cobb, who had the best batting average ever, hit .367. So if you are right 75% of the time, you are going to make a lot of money. If you are gambling, you have to take the big loss to make the big win. Lots of guys say to me, ‘I never took a big loss,’ but they never made a big win either.”

This quote illustrates well an attitude that is common on the Street and characteristic of aggressive traders, dealers, and portfolio managers. There are plenty of gambles around in which you can count on being right

more than half the time; if you are, you'll make money, so to not gamble is expensive and foolish.

Personnel and Sophistication

Most of the traders on the funds desks at large banks have no special academic training for their job. They are people with a good memory, which a fed funds trader requires, who started out in operations and just picked up trading. In a few banks, the trading slot on the fed funds desk is one that fast-track MBAs are passed through for a year.

At small banks, the fed funds desk is often run with much less sophistication than it is at large banks because the person who does the job is the treasurer of the bank and also has to handle governments, repos, and whatever. Sophistication, however, is not only a function of size. A trader at a bank that ranks 150th may be quite sophisticated, whereas one at a somewhat larger bank is merely an order clerk—when she has \$20 million to sell, she calls the broker, gets a quote, hits the bid, writes a ticket, and thinks of herself as a trader.

While a fed funds trader may handle huge sums every day, there is little glamour or recognition attached to the job, as is the case with most money market jobs. Said one trader who handles several billion dollars every day, "I went out to dinner the other night with a fellow from PricewaterhouseCoopers. He said, 'What do you do?' I said, 'Trade overnight funds.' He said, 'Oh, how does your wife like your working nights?'"

Overnight Money

The bulk of the money sold in the fed funds market is overnight money. Much of this money is traded directly between the selling and buying banks.

Because they depend heavily and persistently on purchases of fed funds to cover their basic funding needs, most large banks go out of their way to cultivate smaller correspondents that find it convenient to sell their surplus funds on an ongoing basis to one or several large banks. A smaller bank could, of course, shop in the brokers' market and try to pick up an extra $\frac{1}{16}$, but most don't because the amounts they sell are so small that the cost of trying would outweigh the potential gain. Overnight $\frac{1}{16}$ on \$10 million is only \$17, and that's before the phone bill is paid.

To cultivate correspondents that will sell funds to them, large banks stand ready to buy whatever sums these banks offer, whether they need all

these funds or not. If they get more funds than they need, they sell off the surplus in the brokers market. Also, they will sell to their correspondents if the correspondents need funds, but that occurs infrequently. As a funding officer of a large bank noted, “We do feel the need to sell to our correspondents, but we would not have cultivated them unless we felt that they would be selling to us 99% of the time. On the occasional Wednesday when they need \$100,000 or \$10 million, OK. Then we would fill their need before we would fill our own.”

When the fed funds market was younger and less competitive and the smaller players were relatively unsophisticated, it was not uncommon for buying banks to pay their smaller correspondents a rate well below the New York rate. Today, however, most large banks pay correspondents that sell to them regularly some formula rate—the opening rate, the average rate for the day, or whatever. And even though they know that they may well have to sell off some of the funds they purchase from correspondents, they do not try to arbitrage—buy low and sell high. A banker typical of this attitude said, “We will pay a bank in Cedar Rapids the same rate for \$100,000 that we would pay the Bank of America selling us \$100 million. We do that because we want the bank in Cedar Rapids to be coming back to us. Relative to other sources of funds, fed funds are cheap, and we try to cultivate this funding source.”

A few big banks, however, still see a potential arbitrage, “trading profits,” in selling off funds purchased from smaller banks and attempt to profit from it to reduce their effective cost of funds. Also a few tend to bid low to their correspondents. Said a trader typical of the latter attitude, “We have a good name in the market, so I often underbid the market by $\frac{1}{16}$. A guy with a few million to sell doesn’t care. He’s happy to get his money sold and get on with other banking business.” The tendency to shave rates is particularly pronounced on Fridays because a Friday purchase is for three days. At the opposite end of the spectrum are majors who will offer a small bank an extra $\frac{1}{8}$ or $\frac{1}{4}$ to pick up correspondent-bank business with them. This is the so-called *rebooking* market, where banks without accounts at the Fed rely upon their larger correspondent banks to “rebook” their deposits as overnight loans, which allows them to earn interest on their money.

One of the striking things about the fed funds market is the wide access all banks have to it. A tiny bank with \$50,000 of overnight money to sell won’t be able to sell to one of the top money market banks because such a bank would not bother with such dribbles. But at a rate slightly off the market, it can sell its funds to a regional bank that is happy to take in

small amounts either to fund its own position or to resell in larger blocks. Even S&Ls have gotten into the fed funds game. Small thrifts sell funds through their Federal Home Loan Bank; small credit unions sell funds through a private institution. The *U.S. Central Credit Union*, a cooperative with over \$45 billion in assets in early 2006, acts as a central depository for credit unions.

Smaller regional banks can and do buy large sums in the fed funds market. The market is also open to foreign bank branches, which are major players in the market.

There is some tendency in the fed funds market for banks to expect banks they sell to to be willing to sell to them, and a handful of banks will sell funds only to banks with which they have reciprocal lines. However, the need to “buy one’s way in” is less pronounced in the fed funds market than in the other markets because banks in the fed funds market tend to be one way most of the time—either consistent buyers or consistent sellers.

THE BROKERS’ MARKET

In addition to the large volume of funds traded *directly* between big banks and their correspondents, there are huge amounts of overnight funds traded through *brokers*. In fact, most trades between large banking institutions in the federal funds market are arranged through a handful of brokers.¹⁰ Large banks lay off any excess funds they take in from their correspondents in the brokers’ market. Also, if their needs exceed the amounts they receive from their correspondents, they will buy funds through brokers. There are many regional banks, foreign banks, and foreign agency banks that also buy and sell funds through brokers. And those few funds desks manned by traders who *deal* in funds—buying and selling to pick up a few basis points—add to the volume in the brokers’ market.

Prior to becoming Fed Chairman in 2006, Ben Bernanke said in March 2005 that, “The daily volume of overnight fed funds transactions handled by brokers has ranged between \$60 billion and \$80 billion,” roughly the same amount as nonbrokered transactions.¹¹

¹⁰ Spence Hilton, “Trends in Federal Funds Rate Volatility,” *Current Issues in Economics and Finances*, Federal Reserve Bank of New York, July 1995.

¹¹ These comments are taken from a speech delivered by now Fed Chairman Ben Bernanke on March 30, 2005, before the Redefining Investment Strategy Education Symposium in Dayton, Ohio.

Brokerage

The fed funds rate is an add-on rate quoted on a 360-day-year basis. Thus, if funds were trading at $4\frac{3}{4}$, a purchase of \$50 million of overnight funds would cost the buyer

$$0.0475 \times \$50,000,000 \times \left(\frac{1}{360} \right) = \$6,597.22$$

In addition, she would pay brokerage costs equal to about \$0.50 per \$1 million per day, which works out to about 2 basis points at an annual rate. Brokerage is paid by both the buyer and the seller.

The volume going through the brokers varies from day to day. Friday transactions are particularly attractive to a broker because she earns a three-day commission on them; a Friday sale is unwound on Monday.

The five major brokers in the fed funds market are Garban, Prebon, Tradition, Euro Brokers, and Tullet & Tokyo.

Function of the Brokers

The major function of the fed funds brokers is communications. There are so many participants in the brokers market—all the top 500 banks plus a lot of foreign banks plus various quasi-government bodies—that, in the absence of brokers, the banks would need a host of traders and telephones on their fed funds desk to get their job done.

Each broker has a particular set of names that use her. There is, however, considerable overlap between the clients of the top brokers, since many banks use two or even three brokers on a regular basis. The brokers put in direct phone lines to any bank having a volume of trading through them that justifies the cost. They communicate with the rest over WATS lines. The phone bill for a broker is necessarily huge: she is providing a communications network, and doing so is costly.

The brokers also provide a great deal of information to the Fed, which relies on the brokers on a daily basis to help it to estimate the amount of reserves that will be needed in the banking system in order to keep the fed funds rate in balance with the Fed's target rate.

In addition to communications, brokers also provide the banks with anonymity. A top bank that has a big job to do values this because it fears

that, if it were to bid for or offer huge sums in its own name in the market, it might move the market.

The brokers' market is really open to only those banks that buy and sell in volume. In fed funds, round lots are \$5 million, the same as the notional amount on the fed funds futures that trade at the Chicago Board of Trade. A small bank in Iowa that wants to buy \$500,000 is better off going to its regional correspondent, since the New York brokers are not set up to handle trades of that size. Noted one broker: "We have a guy who sells through us \$300,000 to \$1 million every day. He asks, 'What is the market?' We say, ' $\frac{5}{16}$ – $\frac{3}{8}$.' He says, 'What do I get for \$1 million?' We have to say, ' $\frac{1}{8}$.'"

Trading the Sheet

A fed funds brokering operation today is a rather impressive sight to view: 28 or 30 people sitting around a desk, each constantly talking on one of a battery of direct phone lines, and each constantly scribbling down bids and offers on one sheet of paper. That sheet, however bedraggled it may look, is a key part of the operation since each person on the desk, by glancing at it, can see what banks are bidding and offering through the firm and what the amounts are.

Brokers will often describe what they do as *trading the sheet*. "We do not," said one broker, "trade in the sense of taking a position. But when someone acts in the market, how do we react? That is our trading decision. The first day after a settlement always used to be difficult because it was a slow day. We'd end up with a sheet cluttered on both sides with bids and offers. If a name then came in and said he wanted to sell \$20 million at the bid, we might have 25 names to choose from; ethically, the best we could do was to decide who was there first. When the market is moving, you do not have to worry about this because everyone will be satisfied. A settlement Wednesday is easy because it moves so fast."

Brokering is very much a team effort. Commented the head of one brokering operation, "This job takes concentration and coordination. To run an efficient shop, you cannot have two people on the phone saying that the market is going down and three others saying that it's going up. Avoiding that is hard because our thoughts on the market may change 20 times a day."

Many fed funds brokers come out of the banks, and a number are ex-fed funds traders. Such experience is valuable: an ex-trader knows how to quote the market and understands how to react to what the banks do.

Quoting the Market

Broker: Hello, $\frac{3}{4}$ bid on 50. I am offered at 5 in two spots, 75 firm, 50 under reference.

Bank: I'll take 50.

Broker: OK, 50 done. Can I make it a C note?

Brokering occurs at a breakneck pace. The top New York banks do not want a lot of information, and a broker makes a fast quote to them. In a minimum of words, she attempts to convey the tone of the market. She might, for example, quote the market: " $\frac{5}{16}$ – $\frac{3}{8}$, last at $\frac{5}{16}$," or " $\frac{5}{16}$ – $\frac{3}{8}$, quiet." Some regional banks want a slower quote and a little more information on market developments. Said one broker, "The worst even ask what the *handle* is."

In the fed funds market, banks, in addition to putting *firm* bids and offers into the brokers, will also make *subject* bids and offerings. When a bank's bid or offer is subject or *under reference*, before the broker executes a trade for that bank, she has to go back and ask it if it will make its bid or offer firm. When the Fed goes into the market to do open market operations, it creates uncertainty, and the brokers, in courtesy to their customers, treat all bids and offers as subject until they are renewed.

Part of the fun and the frustration of brokering funds is that the market changes constantly throughout the day. Thus, an important part of a broker's job is to get a line on the market, a feel for its tone and where it is moving. In doing so, she looks not only at her own market, but also at related markets. What is the rate on overnight repo? Where are Eurodollars trading? The top fed funds brokers also broker Eurodollars, repo, and various other instruments, so their people have constant, easy, and immediate access to information on developments in related markets.

Fine-Tuning Quotes

In the fed funds market, whenever a buyer takes a seller's offering, the broker has to go back to the seller and tell her the name of the buyer and

ask her if she will do the trade. The ethics of the game are such that the seller is supposed to do the trade unless she does not have a line to the buyer or her line to the buyer is filled. If the seller can do the trade, the broker then tells the buyer the seller's name, and the buyer and the seller clear the trade directly over Fedwire. Brokerage bills are handled at the end of the month.

Line problems and other subtleties make brokering more than just quoting two rates. A good broker knows what lines various banks have extended to other banks and how big they are. And she tries to guess during the day how much of those lines have been used up. Said one broker: "I know the B of A's lines better than they do. It's not that they told me, but if they keep selling some guy \$X million day after day, I know pretty quickly what their line to him is."

"Because of line problems," commented the same broker, "the quote to each bank is individualized." Line problems become especially acute on a Wednesday when the banks settle and trading is active. "The quote will be one thing to Citi if they have been in the market all day long buying up everything in sight and another story to Morgan if they have been selling all day. A broker is foolish if he says, ' $4\frac{1}{8}-3\frac{1}{16}$,' when there is nothing on the offer side good to the guy on the phone who wants to buy. We may have an offering, but we say none. Or I can say, 'I am $4\frac{3}{16}-1\frac{1}{4}$, but my offer is not good to you. I will work for you at that price.'"

Part of being a good broker is the ability to be a good salesperson—to anticipate a customer's needs and to nudge her subtly into a trade. One broker noted, "This is a pattern market in the sense that many names do not change their posture in the market very much. They are constantly one way or the other. You often know with a good customer what he is going to do and when he is going to do it. A good broker will anticipate what the bank is going to do without letting the bank know and without being pushy. The minute you see a borrowing bank's line ring, you get your people on the phones with the accounts that are going to be selling. So when the bank says, 'I will take 200,' you have the offers all lined up and can say, 'Sold 25,' 'Sold 50,' and so on."

The same broker went on to observe that, "When you have a big buyer on the phone, you try to get a round number out of him. If he asks me how much I might be able to bring down [get for him] and I say 350, my next question might be: 'Do you want 500?' This is a volume market; we can put through a single trade for half a billion a lot easier than we can do five \$1 million trades."

Knowing what a bank might want to do is also important because some big banks fear that showing all they want to do might distort the market. So a bank that is looking for \$1 billion might bid for only \$100 million. When a broker sells money to such a bank, she always tries to keep the trade going by asking: “Can I work some more for you?”

The broker screens show constantly updated quotes on fed funds so that buyers and sellers can use them to track what the market is doing. However, a given broker’s quotes may at any moment differ from those on the screen because the market can move fast. Also, each broker has a somewhat different clientele so that quotes coming out of different brokers may vary slightly.

The Banks

It costs banks money to buy and sell through a broker, but using a broker saves them time and labor. Said one trader: “When I have funds to sell, it is easier for me to go into the brokers and hit 10 or 15 bids than for me to call individual banks.” Also there is the human factor. The same trader continued: “If I sell through the broker and then the rates fall, I feel, well, that the bank was in there bidding at that rate. If I go in and sell direct and then the rate falls off, often the guy who sold will feel I knew something he did not. And the next time I call, he bids below the market.”

Most large banks use several brokers. One reason is that the more brokers a bank uses, the more exposure and information it gets. Another is that a bank with a big job to do may be able to operate faster by using several brokers.

Finally, there is the embarrassment factor. One dealing trader commented: “If on a Wednesday I buy funds at 10 through Prebon and now want to sell at 8, I will go to another broker. I made a mistake, and it’s embarrassing. The guy at Garban says, ‘Hey, you are going to sell before the bottom falls out.’ He does not know I took in the money at 10.”

The banks will also use the brokers to play games with one another. A bank may try to influence where funds are trading by posting high bids when it wants to sell and vice versa.

The Opening

In the early morning, the chatter in a broker’s office is likely to run:

“Work for you? OK, I show you out.”

“ $1/4-5/16$, with a foreign bank paying 5. No opening yet.”

“Light opening at $5/16$, a regional name. I am at $1/4-5/16$.”

Calling an opening is a touchy affair for a major broker because a lot of big banks pay their correspondents the opening rate. Years ago the big New York banks tried on occasion to distort this rate. One broker said: “They were paying correspondents the opening rate, so to ensure they were not getting ripped off, they used to come into the market and hit the bids, and they had an official opening. That was a distortion since the market opened on the bid side. We stopped that because we thought it was unethical. They might sell \$100 million at that price when they had \$500 million that they were committed to buy at that price. We told the banks that, if they satisfied every bidder on our sheet, we would call an opening. If not, we would not. That stopped that.”

Volume and Daily Patterns

It is difficult to know with precision the amount of fed funds that trade daily given that a large amount of volume takes place directly between parties and that such transactions are not tracked. Nevertheless, fairly accurate estimates of the daily trading volume can be derived from the brokered transactions reported to the Federal Reserve Bank of New York by the brokers. Demiralp, Preslowsky, and Whitesell estimate that the average daily volume of all transactions in the fed funds market, including both brokered and nonbrokered transactions, was \$145 billion in the first quarter of 1998.¹² It is believed that trading volume in the several years that followed did not change much. Some of the volume that occurred then and which continues today is from nonbank securities dealers that find themselves unexpectedly long or short cash at the end of the trading day.

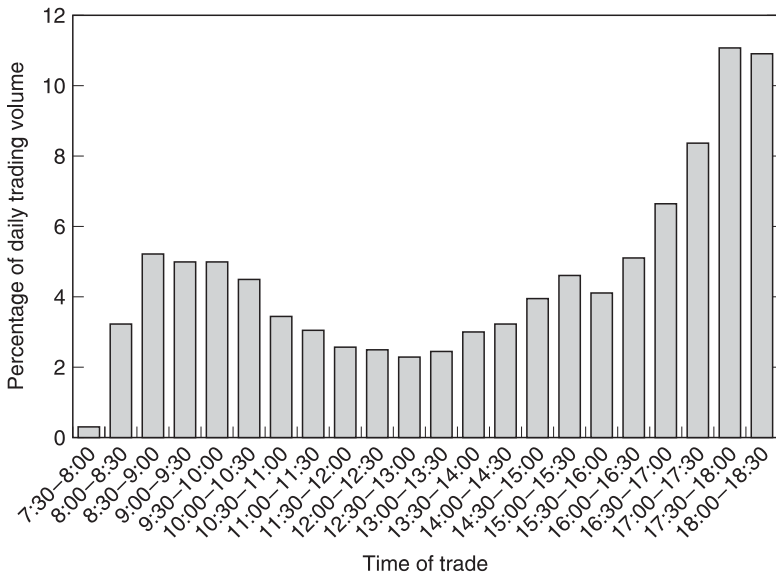
Although price volatility is relatively low in the fed funds market, volatility in trading volume is very high during each trading day. Most of the morning trading takes place between 8:30 and 10 a.m. (ET), before tapering off until the late afternoon and picking up, especially between 4:30 and 6:30 p.m. when about 40% of all daily trading occurs. The largest percentage of trades tends to be in the late afternoon, coinciding with the 6:30 p.m. (ET) closing of Fedwire (Figure 12.3).¹³ The early

¹² S. Demiralp, B. Preslowsky, and W. Whitesell, “Overnight Interbank Loan Markets,” Board of Governors of the Federal Reserve System working paper, 2004.

¹³ L. Bartolini, S. Gudell, and S. Hilton, “Intraday Trading in the Overnight Federal Funds Market,” *Current Issues in Economics and Finances*, Federal Reserve Bank of New York, November 1995.

FIGURE 12.3

Daily volume in fed funds traded from February 2002 to September 2004



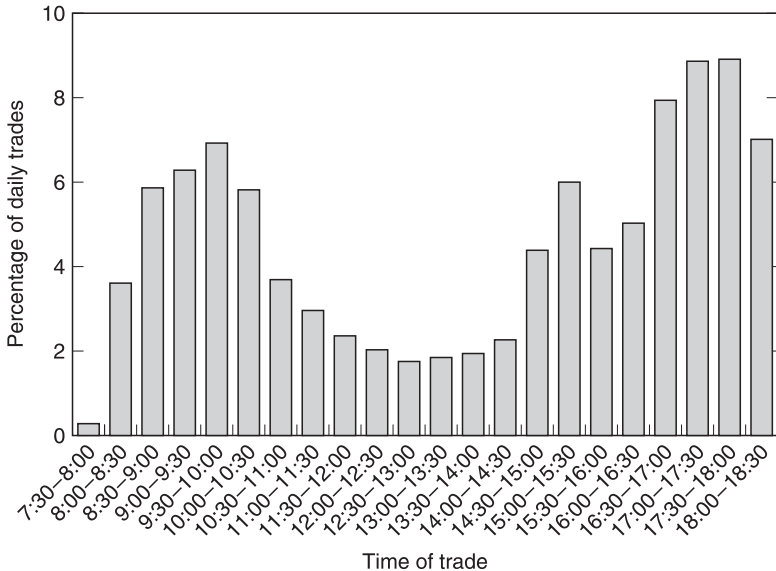
Sources: Euro Brokers, Federal Reserve

morning volume is usually from banks, looking to quickly reconcile their expected cash flows for the day, and from European entities that are winding down their trading at the end of the day in Europe. Larger institutions tend to be more active in the afternoons than in the mornings, mostly because their cash flows are subject to greater variability. This is illustrated in Figure 12.4, which, unlike Figure 12.3, shows a relatively small difference between the numbers of trades that occur in the morning versus the afternoon, suggesting that a larger portion of the early trading volume involves smaller institutions.

Adding to the late afternoon “frenzy” is the closing of the Clearinghouse Interbank Payments System, or CHIPS, a payments system with about 50 members that in early 2006 was clearing over 285,000 transactions valued at \$1.4 trillion daily, not much less than the amount cleared daily over the Fed’s Fedwire Funds Service. CHIPS is a real-time payments system that uses complex programming to continually net payments sent and received by its customers, who keep a small balance at

FIGURE 12.4

Fed funds trades from February 2002 to September 2004



Sources: Euro Brokers, Federal Reserve

CHIPS in order to facilitate the payments. CHIPS customers *prefund* their payments, depositing their money into the Federal Reserve Bank of New York, beginning at 9 p.m. (ET) until 9 a.m. the next day when banks begin sending and receiving payments. That process continues until 5 p.m. when CHIPS nets any unresolved payments and banks refund their respective negative closing positions. At 5:15 p.m., CHIPS releases any remaining payments and then sends payment orders to banks with positive closing positions via Fedwire. It is expected that most participants will pay their prefunded balance requirements by making Fedwire payments from their own reserve or clearing accounts, or, if they do not have their own reserve or clearing accounts at a Federal Reserve Bank, through a correspondent that does have a Federal Reserve account.¹⁴

¹⁴ Report by the Intraday Liquidity Management Task Force, "Intraday Liquidity Management in the Evolving Payment System," April 2000.

The CHIPS system helps financial institutions to decide where their balances stand at the end of the day. For banks that are subject to the Federal Reserve's reserve requirements, once these banks get their CHIPS figures at the end of the day, a new round of trading for them is set off in the fed funds market. Banks busily trade funds to get themselves roughly into the position in which they want to end the day. Banks with excess reserves at the Fed will look to unload them, because no interest is paid on excess reserves. Banks with deficits will borrow fed funds from the market to avoid costly overdraft charges imposed by the Fed.

CHIPS is widely used in part because very little money is required to be prefunded relative to the amount of payments made on a daily basis. This is evident in the fact that only \$2.8 billion in balances were needed to clear the \$1.4 trillion in payments mentioned earlier, which means that each dollar in CHIPS turned over a whopping 500 times. The system got a boost in 2001 when payment finality was implemented, enabling it to compete with Fedwire, which has made money available immediately for years.

Aside from the dynamic nature of CHIPS and the low level of pre-refunding needed to make large amounts of payments during a given day, banks often decide between CHIPS or Fedwire depending upon the demands of their customers. A bank might choose Fedwire over CHIPS, for example, if its customer prefers to send or receive fed funds.

The prefunding requirement set by CHIPS is akin to the Fed's reserve requirements in that the pre-refunding helps to ensure the soundness of the CHIPS payment system. Since 1990, CHIPS has guaranteed settlement finality against the possibility of insolvency of the system's largest debtor, doing so by requiring its participants to maintain collateral in CHIPS and by implementing a loss-sharing formula in the system. The system was fortified further in 1997 when CHIPS reduced the number of net sender debit caps, which put a limit on the net amount by which an institution could draw upon CHIPS balances, and by increasing collateral requirements so that the system could withstand the simultaneous failure of the two members with the largest debit positions. Currently, CHIPS users have a daily credit of up to two times their pre-refunded balance.

CHIPS has had near 100% availability over the years, and its functionality went without interruption on September 11, 2001, and in the days that followed despite the fact that 19 of the 56 banks that were connected to the system at that time were located in or near the World Trade Center. Each of the affected banks shifted its operations to contingency sites

previously put in place. New measures of soundness have been adopted since then to boost its soundness even more.

WEDNESDAY CLOSE

One of the more exciting and volatile times in the fed funds market occurs every other Wednesday afternoon when all depository institutions settle. It's not nearly as volatile as it once was, but still it is enough so to make it interesting.

On a settlement Wednesday, a bank's fed funds desk will try to determine as early as possible what the bank's position is. At 3:15 p.m. (ET) the securities settlement system, Fedwire Security Service, closes and the bank gets a clear idea about its balances and begins to focus on how its balances will look at the end of the day. The bank gets its final net CHIPS number and its number for securities transactions at 5 p.m.; everything else is pretty well cleaned up and steady. One unknown on some of the clearing banks is what monies foreign banks will transfer into and out of the bank late in the day. Foreign banks, that—after they get their CHIPS position—do a lot of volume to work off that position, can cause variability late in the day in a clearing bank's position. Sometimes on a settlement Wednesday, this will create real problems for such a bank. The CHIPS numbers are particularly important to banks dealing abroad because 95% of all U.S. dollar cross-border payments are settled through CHIPS.

Settlement Wednesday is an important day on a fed funds desk, but is no longer filled with the types of uncertainties that once sparked much greater volatility in past years. The Federal Reserve took a number of actions during the 1990s to limit such volatility. One of the most important changes that the Fed made was shifting to lagged accounting, a method that lets banks know their reserve requirements at the start of each maintenance period instead of having to estimate what the amount is in the midst of a maintenance period. Another important development occurred in 1992 when the Federal Reserve raised the amount by which banks could use their excess reserves from one maintenance period to the maintenance period that followed to satisfy their reserve requirements for the previous period. Banks henceforth were allowed carryover reserves equal to 4% of their reserve requirements, up from 2% previously.

Yet another important development in recent years that has helped to reduce volatility on settlement Wednesday has been the Fed's increased monitoring of daily reserve positions in the banking system.

TABLE 12.4

Daily reserve position reports collected by the Fed's trading desk from large banks

	1994	1999	2004
Number of reporting banks	12.0	31.0	118.0
Total value of these banks' requirements (billions of dollars)	6.0	4.5	16.0
Percentage of aggregate total requirements	20.0	40.0	65.0

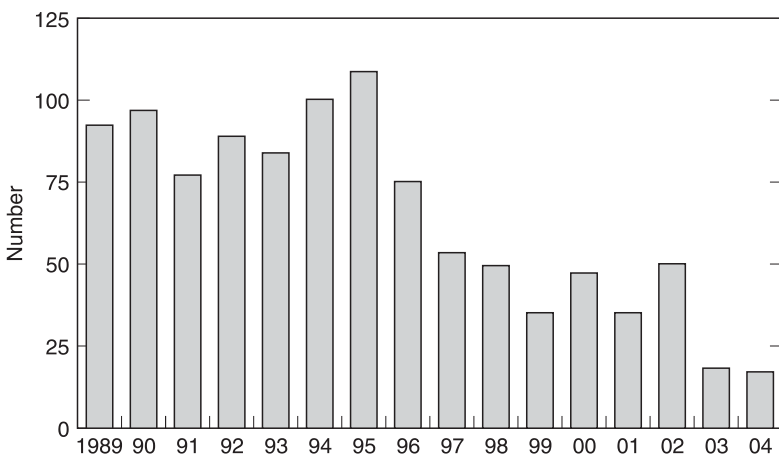
Note: Shifts in requirements during each year make all figures approximate.

Source: Federal Reserve Bank of New York

Table 12.4 indicates that from 1994 to 2004 the Fed substantially increased the number of banks from which it collected data, capturing two-thirds of aggregate total requirements. These data and the Fed's increased recognition of the various patterns that take place during the maintenance period have helped the Fed to place greater emphasis on the daily ups and downs in the demand for reserves. As a result, the Fed conducts open market operations much more often than it once did (Figure 12.5).

FIGURE 12.5

Number of business days when the trading desk did not arrange temporary open market operations



Note: There were about 252 business days each year.

Source: Federal Reserve Bank of New York

Extensions and “As ofs”

On a settlement Wednesday, the loss of a transaction in the system, a mistake by a bank, or a mistake by a broker can set off a panic on a bank's fed funds desk; those at the desk thought they had settled and suddenly find they have not. A bank in this position may ask the Fed to hold the wire open until the mistake is righted or may ask the Fed to permit them to do an *as of* transaction, that is, to do a transaction the next day and be credited for it as if the transfer had occurred on the previous day.

In the scenario that introduced this chapter, a bank was searching wildly for \$150 million that had been lost in the system. The Fed is tough about doing “as of” transactions in such situations because, as someone at the Fed noted, “The way things work out is that if a West Coast bank is supposed to have sent Morgan money and Morgan did not get it, through no fault of either bank [something went wrong with the wire system or a computer], and if we then credit Morgan as if the transfer had been made, there will be no offsetting debit for the West Coast bank; it will be a one-sided adjustment, and we end up giving money away free. The reason is that the West Coast bank will argue that they knew they had sent the money, and when they saw their balance [at the Fed], they assumed that this money had already been taken out and managed their balance accordingly. So to take the money from them now would cause them to end up short through no fault of their own.”¹⁵

A slightly different situation in which a bank might ask for an “as of” transfer is if it had made a mistake in tracking its own balance or if a mistake had been made by a broker. Here is an example of the latter. When Fedwire still closed by districts, a broker commented late one Wednesday afternoon, “We are in trouble. We thought a bank was willing to give up $\frac{1}{8}$ to sell. He says he was not. They misunderstood me, and I misunderstood them. Now we have a bank that is short \$25 million. We will try to find someone outside the district and arrange an ‘as of’ sale.”

The Fed must be strict about its cutoff times because otherwise abuses would occur. Still, the Fed might make allowances for size. “For a small bank in Tulsa, losing \$10 million is like Morgan losing \$500 million. The Fed thinks of the small banks as less sophisticated, so it is more likely

¹⁵ Because of the huge volume of transfers being made into and out of a major bank's account at the Fed, it is not uncommon for such a bank to reconcile its balance at the Fed, which it can track throughout the day, with transfers into and out of that account after both it and the Fed have closed. Thus, a bank could make the honest mistake of assuming that its closing balance reflected an outward transfer that had not gone through.

to let them do an ‘as of’ to cover a mistake than they are to let a New York bank do so,” the broker added.

It is the current understanding of the major banks that the Fed will not permit them to do an as of (*reserve adjustment*) transaction unless failure to do so would cause the bank to be overdrawn at the Fed. A bank that utilizes intraday Federal Reserve credit incurs what is known as a “*daylight overdraft*,” which occurs when a depository institution has a negative balance in its Federal Reserve account at any time during a business day. Positive balances held at the Fed are effectively set to zero and cannot be used as an offset to any overdraft that occurs during a particular day when computing the average daylight overdraft amount. The annual rate charged on daylight overdrafts is 36 basis points, but the amount charged is actually less than that because the Fed charges banks an amount equal to the annual rate multiplied by the number of hours in which Fedwire is open. Currently, Fedwire is open 21.5 hours per day, which means that the *effective annual rate* for daylight overdrafts is 32.25 basis points ($36 \times 21.5/24$). The total daily charge to a bank that incurs a daylight overdraft is equal to the gross overdraft charge just described minus a deductible, which gives banks some degree of latitude to minimize their daylight overdraft charges. Figure 12.6 shows an example of a daylight overdraft charge.

There are a number of circumstances under which the Federal Reserve will allow for an as of adjustment, although most relate to various sorts of processing problems out of the institution’s control. For example, as of adjustments are granted when a Reserve Bank misdirects a payment order, issues a payment order in an amount that is less than the amount that was intended, issues a duplicate payment order or a payment order that is an amount more than was intended, and delays rejection of a payment order.

Extensions of the Fedwire Funds Service are granted under very limited circumstances. Request must be made at least 15 minutes before the scheduled Fedwire closing time. Extensions may be granted only if (1) there is a failure of Reserve Bank and/or the Fedwire Funds Service network equipment; or (2) there is a significant operating problem at a major bank or major dealer; and, as a result, (3) the extension is deemed necessary, in the Federal Reserve Bank of New York’s (or its designee’s) view, to prevent a significant market disruption (i.e., the dollar value of delayed transfers exceeds \$1 billion).¹⁶

¹⁶ For more detailed information on as ofs and extensions, see the Federal Reserve’s Operating Circular, No. 6, at www.frb services.org/OperatingCirculars/pdf/Oc6.pdf.

FIGURE 12.6**Example of daylight overdraft charge calculation****Policy parameters:**

- Scheduled Fedwire day = 21.5 hours
- Deductible percentage of capital = 10%
- Rate charged for overdrafts = 36 basis points (annual rate)

Institution's parameters:

- Capital measure = \$50 million
- Sum of end-of-minute overdrafts for one day = \$4 billion

Daily charge calculation:

- Effective daily rate = $0.0036 \times (21^{5/24}) \times (1/360) = 0.0000089$
- Average overdraft = $\$4,000,000,000 / 1,291 \text{ minutes} = \$3,098,373$
- Gross overdraft charge = $\$3,098,373 \times 0.0000089 = \27.58
- Value of the deductible = $0.10 (\times \$50,000,000 \times 0.0000042)^* = \21.00
- Overdraft charge = $\$27.58 - \$21.00 = \$6.58$.

Similar daylight overdraft activity for each day of the reserve maintenance period (generally 10 business days) would result in a two-week overdraft charge of \$65.80.

* Deductible daily effective rate = $0.0036 \times (10/24) \times (1/360) = 0.0000042$

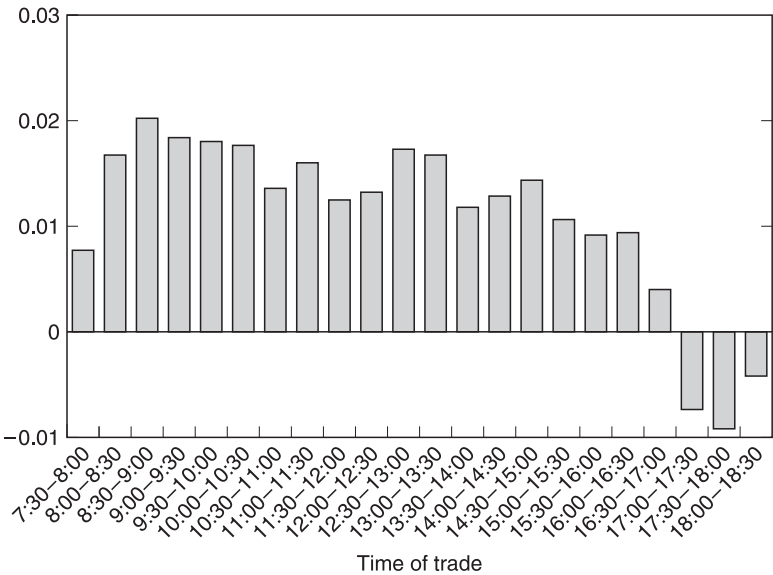
Afternoon Decline in the Funds Rate

Settling is tricky for a bank's funds desk, particularly on settlement Wednesday. A bank can offset large and unanticipated inflows to or outflows of funds from its reserve account right up to the moment Fedwire closes by selling or buying additional fed funds. On an occasional Wednesday, many banks end up with reserves imbalances in the same direction—they are all red or all black. This occurs because the Fed has misestimated the reserves available to the banks, and there are either too many or too few in the aggregate. When this occurs, the funds rate will start to move, although on most days the funds rate tends to move lower in the two hours prior to the closing of Fedwire (Figure 12.7).

The lower afternoon rate apparently motivates larger buyers to sop up any excess reserves that smaller banks wish to unload before the day ends. On settlement Wednesday there are some banks that end up way black late in the day because of a bad estimate or unexpected cash flow. As they pump out money, the funds rate will start to fall; this ought to attract buyers because banks can carry a reserve surplus from the current settlement period forward into the following settlement period, and sometimes

FIGURE 12.7

Deviation of average fed funds rate from target rate
(in percentage points)



Sources: Euro Brokers, Federal Reserve Bank of New York

the banks will bid for the surplus funds to carry them forward. It may, however, happen that most of the big banks were black the previous settlement period. If this is the case, then if they go black again, they will get no credit for the current settlement period's surplus. A bank in this position will bid for additional funds only if the rate is very low and only if it can buy more money than the black it is erasing. For example, if a bank were \$80 million black in the previous settlement period and planned to be \$80 million short in the current settlement period, it would pay it to decrease that short only if it bought more than \$80 million and only if it bought that money very cheaply.

If a bank in such a position bids for funds, it will probably put in an *all or nothing* (AON) bid. An AON bid does not mean that the money all has to come from the same source. It means that it has to equal in total the amount bid for and that is offered at the rate bid.

THE FORMER FORWARD MARKET

So far we have been talking mostly about the market for overnight funds for *immediate* delivery. Before CHIPS went to same-day settlement in 1981, there was a lot of trading in overnight funds for forward delivery (a sale on Friday for delivery on Monday) in connection with Eurodollar arbitrages. One of the Fed's objectives in mandatory same-day settlement on CHIPS was to eliminate the possibilities for technical arbitrages between Eurodollars and fed funds that next day settlement of CHIPS created. Such arbitrages, which were profitable and therefore were carried out for huge sums, cost the Fed money on lost reserve balances; they also resulted in big overdrafts in clearinghouse funds and were therefore a big potential risk.

TERM FED FUNDS

Most transactions in the fed funds market are for overnight (over the weekend in the case of Friday sales) funds. There is, however, a market for what are called *term fed funds*. On term transactions the funds are normally sold for a period of time, normally in the range of a week to six months.

The term market is small for several reasons. Banks, domestic and foreign, that are buyers of term funds have plenty of opportunities to get medium-term, reserve-free, floating-rate monies. Thus, the term market lacks the allure it once had as a source of funds. Uncertainties about potential Fed actions to adjust the level of the fed funds rate also undermine the term market.

REVIEW IN BRIEF

- In 1998, the Federal Reserve ended *contemporaneous reserve accounting* in favor of a *lagged accounting* structure to calculate the required reserves of institutions with reserve accounts at the Fed.
- Reserve requirements haven't changed much since they were set in the Monetary Control Act of 1980, although yearly adjustments are made to the level of exempted balances and to the "low-reserve tranche."

- The Federal Reserve's *Fedwire Funds Service* processed an average of 544,000 transfers per day in the fourth quarter of 2005, averaging \$2.167 trillion of transfers per day.
- The Federal Reserve controls the fed funds rate by adjusting the level of reserves in the banking system. There is much debate over when the Fed began targeting the funds rate rather than reserves, although most people agree that the Fed has been rate targeting since at least 1992.
- In targeting the funds rate instead of reserves, the Fed relinquishes control of the money supply because it must supply as much money as is necessary to keep the funds rate at the target rate.
- The notion that the Fed can control the funds rate by adjusting reserves implies that a liquidity effect exists; researchers disagree because the Fed controls the amount of reserves in the financial system, not the supply of fed funds, at least not directly.
- In addition to the large volume of funds traded directly between big banks and their correspondents, there are huge amounts of overnight funds traded through *brokers*.
- Current Federal Reserve Chairman Ben Bernanke said in March 2005 that, "The daily volume of overnight fed funds transactions handled by brokers has ranged between \$60 billion and \$80 billion."
- Although price volatility is relatively low in the fed funds market, volatility in trading volume is very high during each trading day, with volume much higher in the afternoon than in the morning.
- Adding to the late afternoon "frenzy" is the closing of *The Clearinghouse Interbank Payments System*, or *CHIPS*, a payments system with about 50 members that in early 2006 was clearing over 285,000 transactions valued at \$1.4 trillion daily.
- Settlement Wednesday is an important day on a fed funds desk, but numerous measures taken by the Federal Reserve now limit volatility compared to that of past years.
- The Fed allows *as of* transactions and *extensions*, although with a minimum number of exceptions.

The Repo and Reverse Markets

Over the last several decades, the repo market has become one of the biggest sectors in the U.S. money market. This is hardly surprising, given the current market environment: today, there is so much debt to be financed, so many arbs to be done; also, new strategies are constantly being developed in which repo and reverse play a key role; finally, dealers' matched books have become in many shops a significant trading and profit center in which the vehicle traded is term collateral.

In the first quarter of 2006, the average amount of repo and reverse repo agreements outstanding was \$5.67 trillion, consisting of \$3.38 trillion in repos and \$2.29 trillion in reverses. During the quarter, over \$99.5 trillion in repo trades were submitted by the Government Securities Division of the Fixed Income Clearing Corporation (FICC), an SEC-registered clearing agency that facilitates orderly settlements in the U.S. government securities market and tracks repo trades settled through its system by product type. Daily volume averaged \$1.6 trillion. These data represent only those repos that were reported to the New York Fed by the primary dealers; there are no regularly collected statistics on repos that are transacted outside of the primary dealers. Nevertheless, since dealers are involved in most repos, the figures represent the lion's share of the market. The above amounts include repos transactions in Treasury, agency, agency mortgage-backed, and corporate securities.¹

¹ The Bond Market Association, *Research Quarterly*, May 2006.

DEFINITIONS AND SOME JARGON²

Repurchase agreements (*repos* for short) are contracts involving the *simultaneous sale and future repurchase* of an asset, most often Treasury securities. Typically, the seller buys back the asset at the same price at which he sold it; also, on buyback date, the original seller pays the original buyer *interest* on the implicit *loan* created by the transaction. Interest due on a repo at maturity is at the stated *repo rate* for the stated maturity of the repo.

Transactions in the repo market are referred to by various terms: a *sale-repurchase agreement*, a *repo* (or *RP* for short), or a *reverse*. The term *sale-repurchase agreement* accurately describes how the transaction is typically done. First, a deal is struck between the dealer and his customer. The dealer then sends his customer a *confirmation* (*confirm*) that contains both the *sale* of securities for current settlement, and the *repurchase* of these same securities for settlement at some later date. Figure 13.1 shows the details that would be expected to be included in a confirmation, minus the names of the parties involved.

Repurchase agreements were first standardized in the late 1980s, but they were not used on a global scale until the early 1990s. The two widely used forms of *master repo agreements* include the Bond Market Association's master repurchase agreement (MRA), which is governed by the laws of the State of New York, and the global master repurchase agreement (GMRA), which is published by the Bond Market Association and the International Securities Market Association (ISMA) and is governed by the laws of England. Aside from the governing laws, there are a number of differences between the two master agreements. For example, there is a structural difference in the remedies for defaults. The GMRA bases its remedies on close-out and set-off rights; the MRA relies on termination and liquidation or replacement of securities and deemed liquidation or replacement. In addition, there are market-based differences in events of default, margin calculations, margin for forward transactions, and hold-in custody provisions. Although there have been revisions to the 1995 version of the GMRA and the 1996 version of the MRA (most recently in 2000 for the GMRA), the agreements have not changed much since then.

² Much has already been said in this book about repos, reverses, and their uses. This chapter builds on and amplifies these earlier discussions.

FIGURE 13.1**Details of a repo transaction**

<HELP> for explanation, <MENU> for similar functions. N170 Govt RRRRA
Enter all fields and hit <GO>.

REPO/REVERSE REPO ANALYSIS

US TREASURY N/B T 5 1 05/15/16 100-29 /100-30 (5.01 /00) BGN @14:37
CUSIP: 912828FF2

SETTLEMENT DATE	6/ 6/06	RATE (360)	4.9200%
PRICE	98.9216885	COLLATERAL:	102.0000% OF MONEY
YIELD	5.2652670	Y/N, HOLD COLLATERAL PERCENT CONSTANT?	☒
ACCRUED	0.3063859	Y/N, BUMP ALL DATES FOR WEEKENDS/HOLIDAYS?	☒
FOR 22 DAYS.		ROUNDING	1 1 = NOT ROUNDED 2 = ROUND TO NEAREST 1/8
TOTAL	99.2280744		

FACE AMT	1000	<OR>	SETTLEMENT MONEY	992280.74
<OR> To solve for PRICE: Enter		NUMBER of BONDS, SETTLEMENT	MONEY & COLLATERAL	
TERMINATION DATE	6/ 7/06	<OR>	TERM (IN DAYS)	1
ACCRUED	0.320312 FOR 23 DAYS.			

MONEY AT TERMINATION

WIRED AMOUNT	992,280.74
REPO INTEREST	135.61
TERMINATION MONEY	992,416.36
NOTES:	

Australia 61 2 9777 8600 Brazil 5511 3048 4500 Europe 44 20 7330 7500 Germany 49 69 920410
Hong Kong 852 2977 6000 Japan 81 3 3201 8900 Singapore 65 6212 1000 U.S. 1 212 318 2000 Copyright 2006 Bloomberg L.P.
6927-136-2 06-Jun-06 14:38:13

Source: Bloomberg

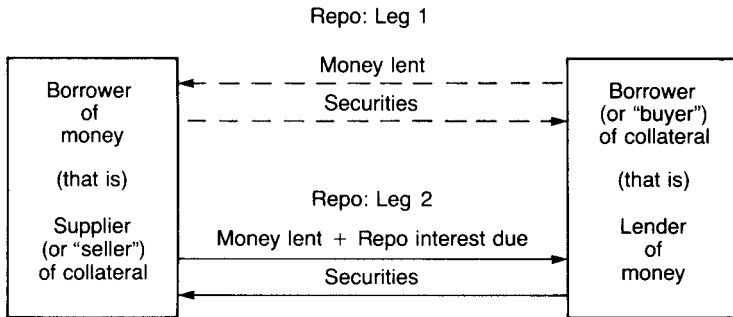
Because the term *sale-repurchase agreement* is a mouthful, Street people talk about doing repos and reverses. While the terms *repo* and *reverse* slip easily off the tongue, they can be confusing because the Street uses them with little consistency. The essential point is this: a repo or a reverse—one *firm's repo is necessarily another's reverse*—is a loan secured by collateral in the form of securities. One side lends money, the other side lends (or *reverses out*) securities. At the risk of adding confusion, we note that the party lending money is sometimes said in Street-speak to be *reversing in securities*.

To help keep all this straight, bear this in mind: when a dealer says he is going “to repo securities,” he means that he is going to finance securities he owns or securities he has reversed in; in contrast, when an investor says he is going “to do repo,” he means he is going to invest in repo, that is, to finance someone else’s securities.

Despite the fact that repos and reverses take the form of sequential sales and repurchases of securities, everyone on the Street agrees that the *economic essence* of the transaction is that it is a *collateralized loan*, not

FIGURE 13.2

Money and securities flows in a repo: *Leg 1* can be viewed as a collateralized borrowing or as a “sale” of securities; *Leg 2* reverses this transaction and provides for payment of repo interest



a pair of securities trades. Specifically, on the day the transaction is initiated, securities are sold against money; on the day the transaction is unwound, these flows are reversed—the money and the securities are returned to their original holders with the initial money holder getting something extra in the form of interest for the use of his money during the term of the transaction (Figure 13.2).

Interest Due on a Repo

Repos are always quoted in the market in terms of the interest rate paid—the *repo rate*. This jibes with the interpretation of a repo (or a reverse) as being a secured loan to the seller of the securities with the securities “sold” serving as *collateral*.

The repo rate is a straight add-on interest rate calculated on a 360-day-year basis. So interest due is figured as follows:

$$\text{Interest due} = (\text{Principal amount}) \times (\text{Repo rate}) \times \left(\frac{\text{Days repo is outstanding}}{360} \right)$$

CREDIT RISK AND MARGIN

In a repo transaction, the lender is exposed to risk. Interest rates might rise, forcing down the market value of the securities taken in; if the borrower

then went bankrupt and the repurchase were not executed, the lender might be left holding securities with a market value of less than the amount it had lent. Assuming the securities repoed have not been trading above par, the lender could make itself whole by maturing these securities, but if the lender needed the money it had lent, that might be impossible or it might be expensive because it would force the lender into other suboptimal decisions.

The borrower in a repo transaction also incurs a risk. Interest rates might fall during the life of the agreement, forcing up the market value of the securities it had sold. If the lender then went belly up, the borrower would be left holding an amount of money smaller than the market value of the securities it had sold. So by retaining the money lent to it instead of effecting the agreed-upon repurchase, the borrower would incur a loss.

In every repo transaction, no matter how the collateral is priced, both the lender and the borrower are exposed to risk. The lender can seek to protect itself by asking for *margin*, that is, by lending less than 100% of the market value of the securities it takes in; but in doing so, it *increases* risk for the borrower. Alternatively, the borrower might seek to reduce its risk by asking for *reverse margin*, that is, by asking the lender to buy its securities at a price above their market value, but that would increase risk for the borrower. No strategy exists to simultaneously reduce risk for both the borrower and the lender.

Margin in Practice

Traditionally on a repo transaction, the lender of money, because it is lending the more liquid asset, receives margin. To provide that margin, securities used as repo collateral are priced at market value minus a *haircut*; the size of the haircut varies depending on the maturity, quality, scarcity value, and price volatility of the underlying collateral, on the term of the repo, and on the creditworthiness of the customer. The standard haircut is generally between 1% and 3%, although borrowers of low creditworthiness could see haircuts as high as 10%. In accordance with Basel II, the revised framework for the International Convergence of Capital Measurement and Capital Standards, standardized supervisory parameters for haircuts were to be applied in 2007, but banks would also be allowed to apply their own haircuts if they met certain qualitative and quantitative criteria. Opponents of the standardization of haircuts argue that standardized rates should not apply in all circumstances because it boosts capital costs and fails to fully recognize the low-risk nature of repo transactions.

Affected institutions prefer haircuts that properly reflect economic risks as well as their own risk calculations.

GROWTH OF THE MARKET

Dealers first began to use the repo market to finance their positions shortly after World War II. Later, as large banks began to practice active liability management, they joined the dealers in the repo market, using it to finance not only their dealer positions, but also their government portfolios. Over the years, the market, which was initially small, grew dramatically. In 1969, the Fed amended Regulation D to make clear that repos done by banks against governments and agencies (banks were already doing them) were borrowings exempt from reserve requirements. The same amendment also specified that repos done by banks against other instruments—CDs, BAs, and loans in particular—were subject to reserve requirements; the amendment thus killed banks' use of the repo market to finance such instruments.

A second factor that contributed to the rapid growth of the repo market was the Treasury's decision in 1974 to shift the bulk of its deposits from Treasury tax and loan (TT&L) accounts at commercial banks to accounts at the Fed. This shift freed billions of dollars worth of governments and agencies that the banks had been holding as collateral against Treasury deposits for use as collateral in the repo market.

Acceptance by investors of repo as a money market instrument grew in step with the increased use of the market by borrowers. The historical highs to which the Fed pushed interest rates on several occasions beginning in the late 1960s made corporate treasurers acutely aware of the opportunity cost of holding idle cash balances. In response, they became big investors in repo, which offered them a way to invest highly variable amounts of money on a day-to-day basis. By the mid-1970s, most corporations, including many that a few years earlier did not know what repo was, had amended their bylaws to permit them to invest in repo.

State and local governments and their agencies have also become investors in repo. Such government bodies are frequently required by law to hold their excess cash in bank deposits or to invest it in governments and agencies. Also, they are typically not permitted to take a capital loss on their investments, which means that they cannot invest in a security that they are unsure they will be able to hold to maturity. Repo collateralized by governments and agencies offers state and local governments—whose regulations permit them to use it instead of outright purchases of

governments—a way to invest tax receipts and proceeds of note and bond issues in *any* amount for *any* period. The volume of money going into the repo market from state and local governments can at times be fairly large. If California sells \$2 billion of bonds, all that money can be immediately invested in the repo market, and it stays there until it's needed. Most states set limits on the maximum maturity of term repo that they are allowed to invest in; California law in early 2006 allowed a maximum maturity of one year for repos and 92 days for reverse repos. Proceeds of a reverse repurchase agreement could be invested in maturities that matched or were shorter than the expiration of the reverse. In California's fiscal year ended 2005, it had entered into 20 repo agreements, carrying a value of \$4.0 billion. At the end of 2005, states and local governments had \$135 billion of security repurchase agreements outstanding.

Today, foreign central banks and other foreign investors are big investors in the repo market, having sharply boosted their presence between 2001 and 2005. During those years, the total amount of repo agreements held by foreign investors increased from \$151 billion to \$701 billion, largely reflecting the sharp increase in foreign ownership of Treasuries, to \$2.198 trillion at the end of 2005 from \$1.095 trillion at the end of 2001. Often, they invest in repo by putting most of their short-term excess dollars in a repo pool run by the New York Fed. In 2005, the average daily change in the size of the pool was \$756 million, a relatively small figure compared to the size of the repo market. A number of foreign central banks also do repo through money center banks. Supranational entities, like the World Bank, also supply funds to the repo market.

Another important class of investors in repo is the money market mutual fund industry, which collectively has the job of keeping about \$2 trillion (as of June 2006) invested short term. At the end of 2005, money market mutual funds had \$346 billion of repo agreements outstanding, the second-most next to foreign investors.

Other major players in the repo market at the end of 2005 included government-sponsored enterprises, with \$115 billion of repos outstanding; mutual funds, with \$110 billion outstanding; and insurance companies, with \$73 billion outstanding.

Dealer Repos and Reverses

As mentioned earlier, it's possible to glean an idea of what goes on in the repo and reverse markets from Fed figures on the repos and reverses done

by U.S. dealers in government securities. The dealer community’s total repos and total reverses fluctuate month to month (part A, Figure 13.3), reflecting that, on a net basis, dealers in governments—during the period considered—had variations in the amounts of positions to finance. Most of the positions financed during the 2000s were increasingly in securities other than U.S. Treasuries, particularly corporate and agency securities. In fact, dealers were rarely long Treasuries in the 10 years ended June 2006

FIGURE 13.3

Financing activity of U.S. government securities dealers
A. Total repos and reverses outstanding (in billions of dollars)
B. Net positions in U.S. Treasuries held by primary dealers (in millions of dollars)

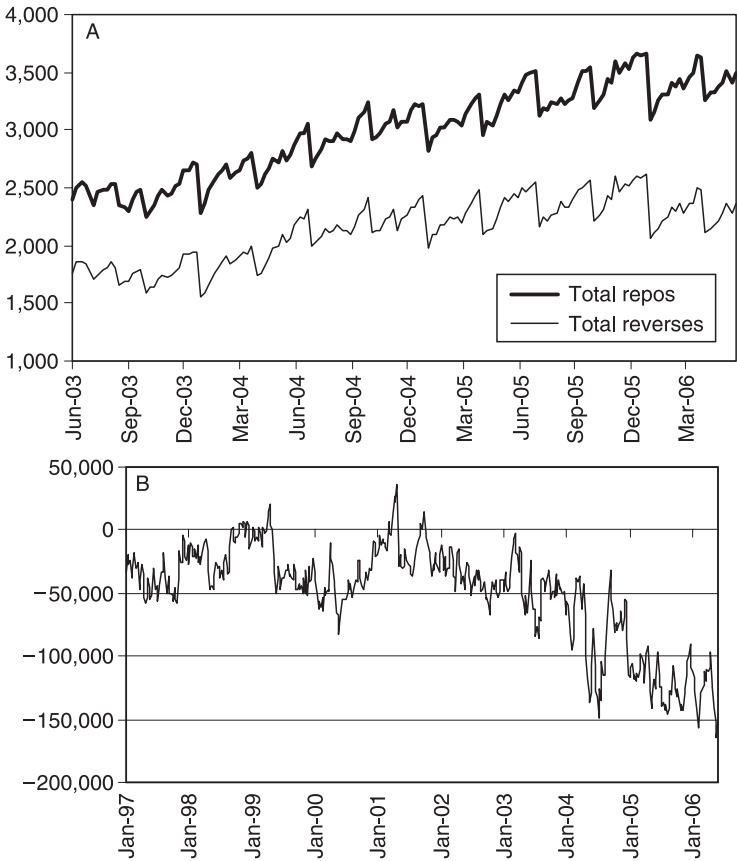
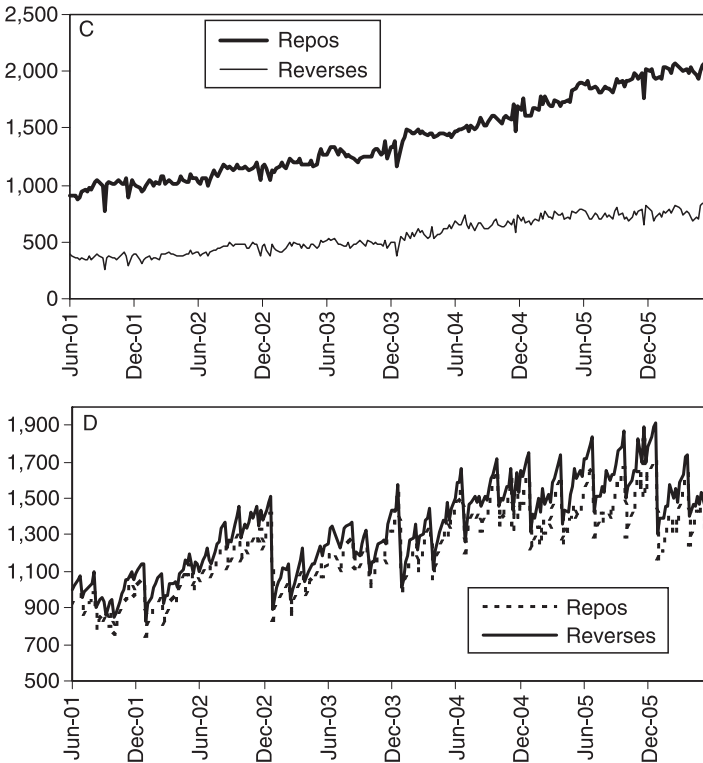


FIGURE 13.3—cont'd

C. Overnight repos and reverses outstanding (in billions of dollars)

D. Term repos and reverses outstanding (in billions of dollars)



Source: Federal Reserve Bank of New York

(part B, Figure 13.3). Dealer holdings of corporate bonds have increased sharply, jumping fivefold in the five years ended June 2006 to \$200 billion. Dealer holdings of agency securities ranked second behind corporates in June 2006, at \$110 billion.

The large amount of reverses that dealers do reflects not only their covering of shorts, but also the substantial growth, discussed below, of the matched books they run in repo and reverse. Parts C and D of Figure 13.3 show that dealers tend to run *short* books in repo and reverse: consistently, dealers borrow more money doing overnight and open repos than they

lend doing overnight and open reverses; and consistently, dealers lend more money doing term reverses than they borrow doing term repos.

Repo and Market Decisions

The repo market gives investors who are willing to base their investments on market judgments tremendous flexibility with respect to where along the yield curve they want to commit their funds. If the answer is at the very base of the yield curve, they can roll overnight repo indefinitely.

At times doing so can be very attractive. In 1982, when yields were high and looking as if they might go higher, fed funds and repo traded in the range of 14% to 15%, while short bills were yielding only 12% to 13%. Thus, at that time, a portfolio manager who owned short bills could have picked up 200 to 300 bp in yield by selling his bills and investing in the same instrument under repo. In 2005, when the yield curve was exceptionally flat, and in early 2006 when it inverted, repo again offered an investment alternative to portfolio managers who may have felt uncertain about where long-term rates might be headed given the uncertainties surrounding when the Federal Reserve might end the interest-rate hikes that it was implementing at that time.

THE OVERNIGHT REPO RATE

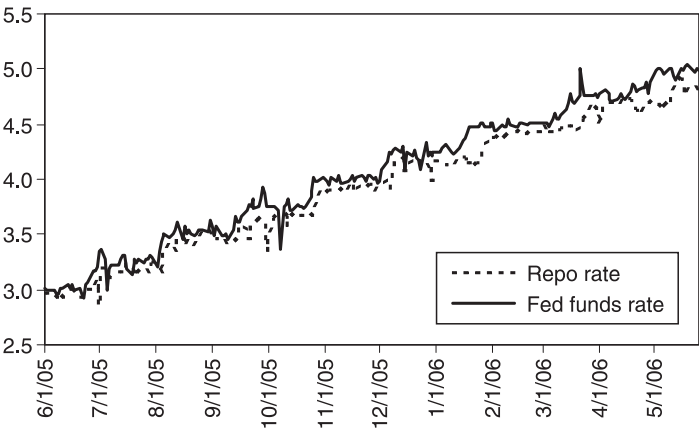
The overnight repo rate (Figure 13.4) normally lies slightly below the fed funds rate for two reasons. First, a repo transaction is in essence a secured loan, whereas the sale of fed funds is an unsecured loan. Second, many investors—corporations, state and local governments, and others—who can invest in repo cannot sell fed funds.³

An institution that can't sell fed funds could invest short term by buying securities that are scheduled to mature in a few months or even a few days. Doing so, however, is usually unattractive. In recent years the yield, even on 1-month bills, has consistently been below the repo rate (Figure 13.5); and on still shorter bills the yield discrepancy has been even greater. The reasons are several. First, many investors, including some state and local government bodies, can't invest in repo; they have to own the securities outright. Second, short bills are often used by dealers as

³ Such institutions can't sell fed funds because banks are not permitted under Reg Q to pay interest on overnight money they take domestically from nonbank sources.

FIGURE 13.4

Repo rate versus the fed funds rate

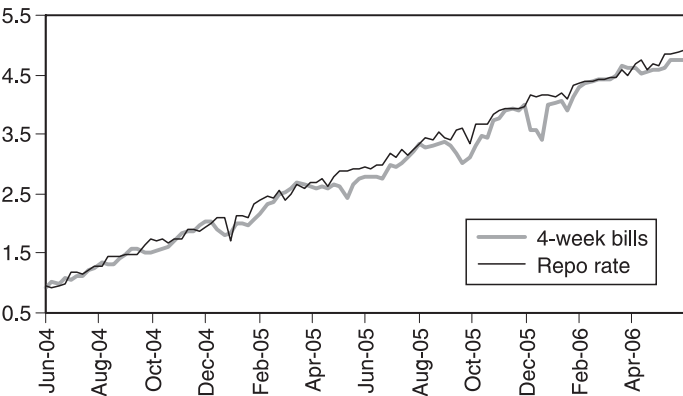


Sources: Federal Reserve, Bloomberg

collateral for short positions (holding short bills for collateral exposes a dealer to no significant price risk). Third, many short bills are held by investors who intend to roll them at maturity and who never consider the alternative of selling out early to pick up additional basis points. Fourth, money funds tend to sop up any short paper, including bills, that

FIGURE 13.5

4-week T-bills versus the repo rate



Sources: Federal Reserve, Bloomberg

they can find to keep the average maturity of the securities in their portfolio short.

The spread between the fed funds rate and the repo rate tends to be very tight, averaging 9 bp during the period January 3, 2005, and May 19, 2006 (the standard deviation was 7 bp). Importantly, the three widest spreads occurred at the end of a quarter, with the spread as wide as 58 bp on September 30, 2005, and 50 bp on both March 31, 2005, and June 30, 2005. The demand for money tends to be strongest at the end of a quarter when financial institutions and corporate entities engage in “window dressing” by altering their balance sheets for reporting purposes.

How wide the spread gets is also affected by the supply of collateral available. At times, when the Fed is doing a lot of adding—for example, to offset a shift in Treasury balances—the supply of collateral on the Street will dry up, and the spread between the repo rate and the funds rate will widen. At other times, when the Treasury has just sold a large amount of new debt that has yet to be fully distributed, dealers will have a lot of collateral, and the spread between the funds rate and the repo rate will narrow.

Most of the borrowing done in the repo market is collateralized by governments and agencies. Dealers, however, also repo other money market instruments, including BAs and commercial paper, albeit in very limited amounts (Figure 13.6). The spread between the repo rate on governments and that on other securities can be negligible if there is a shortage of collateral on the Street, but normally this spread is 5 to 10 bp for agencies and up to 15 bp or so for mortgage securities. Such was the case in the 18 months ending June 2006, with the spread between the overnight repo rate for agencies averaging 5 bp more than the overnight repo rate for Treasuries. The standard deviation for the period was 5 bp.

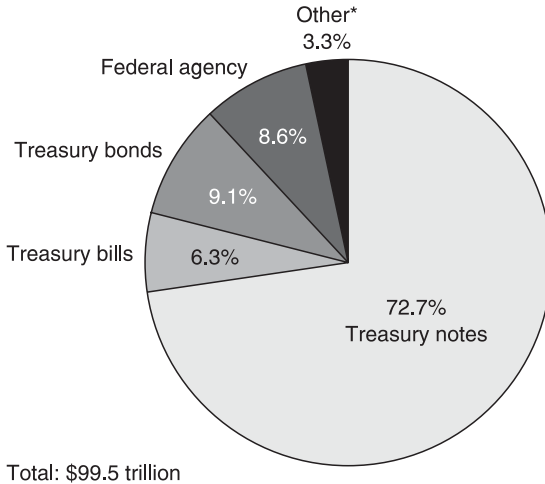
OPEN REPO

Under an *open repo* or *continuing contract*, a lender agrees to give a dealer some amount of funds for some period. The agreement can, however, be terminated by either side at any time. Also, the dealer typically reserves the *right of substitution*; that is, he can take back securities he needs—because he has sold or wants to sell them—and give the lender other collateral.

The rate paid on an open repo, which often varies from day to day, is normally set slightly above the overnight repo rate. On an open repo, a dealer incurs smaller clearing costs than when he does a series of

FIGURE 13.6

Repos consist of more than just Treasuries—repo trades submitted to the FICC, first quarter, 2006



*Includes discount agency, forward starting generic repo trades, TIPS bonds, and TIPS notes.

Sources: Bond Market Association, FICC

overnight repos; he is thus willing to pay up for money obtained on an open basis.

TERM REPO

Dealers enter into term repo agreements to speculate—to create (as noted in Chapter 10) future securities they view as attractive. Dealers and others also do huge amounts of term repo, when the structure of interest rates is such that cash-and-carry trades are profitable.⁴ Some large banks use term repo to finance the longer maturities in their portfolios to keep their book from being too short. Other large banks, however, rely strictly on overnight repo to finance their portfolios. Said one banker typical of the latter group, “We do mostly overnight repo and feel comfortable with that because the demand placed on us for collateral far exceeds the supply we have. We could repo our government portfolio two or three times over every day.”

⁴ For examples see Chapters 15 and 16 on futures.

Although there is an extraordinary amount of funding to dates—tax dates, dividend dates, and so on—that corporations do, corporations are not very big lenders in the term repo market. Public bodies, however, are a fairly large source of money in the term repo market. For the institutional investor wanting to fund to a specific date, a big attraction of term repo is that it can usually do it in size to any date it chooses; this eliminates the need for the institution to scour the world for short paper maturing on its date.

Many investors, including municipalities and some financial institutions, cannot take a capital loss because of legal or self-imposed restrictions, but they can take an interest loss. Suppose such an investor has money that it thinks will be available for six months but that it might need sooner. It can't invest in 6-month bills because, if it did, the institution might incur an accounting loss if it sold them. The institution can, however, take the same or similar securities in on a 6-month reverse repo; that is, invest in 6-month term repo. If three months later the investor finds that it needs its money and the bill market is in the "chutes" (prices are down), the investor can repo out the collateral it has taken in. In doing so, the investor may incur a *loss of interest* because the rate on the repo it does to borrow exceeds the rate on the term repo in which it invested (i.e., the investor may have negative carry on its offsetting repo transactions), *but* it won't incur a capital loss. Often, municipalities can repo securities they have obtained on a reverse but not securities they own outright. So a number of municipalities invest in term repo to get the protection and flexibility described in the example above.

On a term repo, as on an open repo, a borrower of money often would like to be able to substitute one batch of collateral for another. Maybe the borrower is a dealer who's financing inventory for some number of days; if so, he'd like to be able to sell from his inventory; and to do so, he must be able to give the lender of money new collateral for the old collateral he's sold and wants to deliver out. For a slightly sweeter repo rate, a number of investors will grant a dealer *the right of substitution*. "Instead of 4.60, we might," noted one big dealer, "pay 4.62 to get the right of substitution. Some accounts will give us that right; others won't."

GENERAL COLLATERAL FINANCE (GCF) REPO

In recent years there has been a sharp increase in requests for repo collateral substitutions, particularly at quarter's end. The trend became especially apparent when at the end of June 2004, the FICC received more

than 500 substitution requests in excess of \$130 billion from interdealer brokers, an increase of more than 70% over previous quarter-end requests.⁵ Years prior, in 1998, the FICC⁶ in conjunction with the Bank of New York and Chase Manhattan Bank, introduced a system called the *General Collateral Finance (GCF) repo* service, designed to enhance their members' ability to trade general collateral repos by removing the constraints on collateral notification and allocation. The system allows dealers to trade general collateral repos based on rates and terms on a blind-brokered basis throughout the day without requiring settlement on a trade-for-trade basis. The key to the system is that it allows both the borrower and the lender of monies and securities to settle their daily transactions on a *net* basis, as long as their trades have been reported as compared by the FICC. Securities eligible for comparison include all Treasury securities, and non-mortgage-backed agency securities.

Fleming and Garbade identify three ways in which GCF repo reduces transaction costs and enhances liquidity in the interdealer repo market. First, by allowing for netting in both legs of the settlement process, fewer transfers of monies and securities occur, thereby reducing settlement costs. It is more costly, for example, to settle interdealer repos on a trade-by-trade basis. To illustrate the reduction in transfers that occurs under GCF repo, Fleming and Garbade note that in 2002, average net settlement volume of GCF repo was \$101 billion compared to an average of \$721 billion for daily gross settlement volume. A second way in which GCF repo reduces costs is by accommodating the repo settlement later in the day. This is a big advantage over conventional repo transactions in which borrowers of funds have to identify the securities that they intend to deliver by about 11 a.m. and then deliver the securities they identify. Dealers sometimes are unable to deliver the securities specified because of failures to receive the securities from other parties. This forces the dealer to ask the lender whether it would accept other securities. A third advantage of GCF repo is that it allows for greater flexibility in the substitution

⁵ Depository Trust & Clearing Corporation (DTCC), "FICC Tackles Surge in Repo Collateral Substitutions in U.S. Government Securities Market," in the publication titled @dtcc, June 2005.

⁶ The FICC was formed following the merger of the Government Securities Clearing Corp. (GSCC) and the Mortgage-Backed Securities Clearing Corp. (MBSCC), which was approved by the SEC in December 2002. GCF repo was created by the GSCC in conjunction with the banks mentioned.

of securities that are on term repos. In a conventional repo transaction, collateral substitutions require two settlements, one for both the return of the original collateral and a second for the new collateral. GCF repos are reversed every morning and renewed every afternoon, giving the borrower of funds the ability to substitute the securities it is using as collateral for its loan.⁷

Dealers may submit GCF repo transactions to the Government Securities Division of the FICC in amounts up to \$2 billion, much more than the \$50 million for conventional repo transactions. The Government Securities Division acts as a counterparty for settlement purposes to each dealer party to a GCF repo, and it guarantees settlement of GCF repos upon receipt of trade data. The Government Securities Division begins accepting data on GCF repo transactions at 8 a.m. (ET), about an hour after repo trading begins.

THE YIELD CURVE IN REPO

In the repo market, as in other markets, the yield curve normally slopes upward, but at the very short end of the market, the curve frequently inverts; in particular, the overnight rate is often a few basis points higher than the rate on a 1- or 2-week repo. For example, in the one-year period ending June 2006, the overnight rate averaged 1 bp more than that of the 2-week rate. The reason is that short-period repo competes with commercial paper for investors' dollars, while the overnight repo rate relates to the frequently higher dealer loan rate, which in turn keys off the fed funds rate. Precisely what relationships exist among repo rates of differing maturities depend on the availability of financing to dealers and on the amount of collateral they have to finance.

BROKERING OF REPO

It used to be that little brokering of *stock* repo was done; that is, the repo normally done by dealers and banks to finance their positions and portfolios. Banks and dealers have a customer base with which they can do such transactions directly and efficiently. Also they view repo as part of their customer line—one more thing they can show customers.

⁷ Michael J. Fleming and Kenneth D. Garbade, "The Repurchase Agreement Refined: GCF Repo," Federal Reserve Bank of New York, *Current Issues in Economics and Finance*, June 2003.

This has changed a great deal over the years. Today, dealers are using repo much more actively and not just as a financing tool. This branch of the market is known as the *term-specials* market; it involves the trading of specific issues on repo, discussed below. Half of the multi-trillion dollars' worth of matched books (discussed below) that most dealers run are necessarily repo transactions. Dealers can do that volume of trading efficiently only by relying on brokers for a lot of interdealer trading.

Noting the change in the way repo is used by dealers today, one broker noted, "Dealers now view the repo market just like any other market. Their matched-book traders will give you bids against securities and rates at which they will offer securities based on their expectation of rates. Today, our market is as actively traded as other sectors of the money market."

Tri-Party Repos

While some large investors are willing to do *letter repos*, which are non-delivery repos also known as *hold-in-custody repos* (HIC), others aren't. To do a variant of hold-in-custody repos with reluctant customers, certain big dealers and their clearing banks invented *tri-party* repos.

It is common for large investors to negotiate with their dealer and with their dealer's clearing bank tri-party repo agreements in which the clearing bank not only knows both sides of a repo transaction but also holds the repo collateral put up by the dealer in custody for the investor for the life of the repo. Such an agreement has several advantages. It obviates the need for delivery of collateral, while protecting the interests of the investor whose credit risk becomes that of a major bank rather than that of the dealer. A tri-party repo also reduces the clearing costs associated with a large repo and makes substitution of collateral on such a repo cheaper and simpler for both the dealer and the investor.

On a tri-party repo, the dealer pays the clearing bank a fee, but the investor does not. Typically, tri-party repos are done for large sums. Big investors, who do tri-party repos, may and sometimes do send their auditors around to check whether the clearing bank has in fact segregated their collateral. On such a repo, the dealer's collateral does not come back to him until he repays his loan from the investor.

Custodians in tri-party repos are required to hold the specific repo security directly in the name of the repo buyer, free of any third party lien, charge, or claim. This means that pooling of securities is not permitted

under a tri-party repo. The securities must also be segregated from the repo seller's securities that the custodian may be holding.

In recent years, the repo market has moved toward tri-party repos as one of its preferred settlement methods, especially when compared to the delivery-versus-payment method. The move has been in recognition of the cost savings as well as the greater ease at which tri-party repos can be executed. The Federal Reserve has also embraced the use of tri-party repos, partly at the urging of the Street. The Fed accepts, as collateral for tri-party repos, U.S. Treasuries, pass-through mortgage securities of the Government National Mortgage Corporation (Ginnie Mae), the Federal Home Loan Mortgage Corporation (Freddie Mac), and the Federal National Mortgage Association (Fannie Mae), as well as Treasury STRIPS and "stripped" securities of other government agencies.

THE FORWARD MARKET IN REPO

There used to be no forward market in either overnight repo or term repo. Occasionally, however, a dealer or a bank would negotiate a forward repo deal with, for example, a government body that knew money would be coming in on a tax date.

Today, the situation has changed. Dealers have for years traded a coming Treasury issue on a WI (when and if) basis as well as a forward repo rate that settles the day a new Treasury issue that's been trading WI settles. Thus, on each Treasury issue, dealers now trade both their position and their financing rate as of the settlement date. For WI issues, forward trading of repo begins upon the announcement date of the new issue and ends on the settlement date. This is evident in the fact that the liquidity premium for WI issues reflect the expected repo rate for that security. Forward trading of repo, once small and occasional, is now huge and occurs for every Treasury issue that trades WI.

REPOS IN FED OPEN MARKET OPERATIONS

As noted in Chapter 9, the Fed is a significant and frequent player in the repo market. In its open market operations, the Fed uses *outright purchases* of government and agency securities to make permanent additions to bank reserves. In 2005, the Fed added roughly \$28 billion to bank reserves in the 24 operations of outright purchases it conducted. The Fed adds additional

reserves to the banking system on a temporary basis via repo transactions it conducts in its daily open market operations.

Repos are by far the most frequent transaction the Fed does in connection with open market operations. Doing repos is the only way that the Fed can offset temporary drains on bank reserves; these occur frequently, but according to no set pattern. Thus, the Fed, during a given reserve period, may be in the market day after day doing repos, and it is rarely out of the market. Frequent repo transactions have the added benefit of helping the Fed to maintain the fed funds rate close to its desired objective (see Chapter 12).

In 2005, the open market desk of the Federal Reserve Bank of New York arranged short-term repos on all but seven business days. The average size of these daily operations was \$6.4 billion. Of the 256 short-term repo operations conducted in 2005, 204 of them were overnight transactions. Nearly all of the rest were 14-day repos, which were arranged every Thursday at an average size of \$8.7 billion (one of the multiday repo transactions was for 28 days at the end of the year to meet elevated seasonal demands for money in the banking system).

MSPs⁸

When the Fed wants to drain reserves temporarily, it can do so by doing matched-sale purchases (MSPs) with the Street. Because the Fed must secularly raise bank reserves, it finds that the occasions on which it wants to do MSPs with the Street are far fewer than the occasions on which it wants to do repos with the Street. In fact, the Fed did not conduct any MSPs in 2005 and it conducted just two MSPs in 2004.

Today, the Fed does repos and reverses only against government and agency collateral.

THE REVERSE MARKET

Many smaller banks that won't trade their portfolios will occasionally reverse out securities for various reasons: because repo money is slightly cheaper than buying fed funds, because—in the case of term repo—they expect the funds rate to rise and they need cash, or because they see an attractive opportunity to arbitrage.

⁸ MSPs are the Fed's version of reverses. See later section, "Fed Use of Repos and Reverses Today."

S&Ls also dabble in the reverse market. S&Ls will put securities out on repo when they are shown an opportunity to reinvest the funds they obtain at a higher yield in some other instrument, such as agency securities, for example.

When the yield curve is flat, banks and S&Ls may reverse out securities as part of an arbitrage for as little as a $\frac{3}{16}$ spread, but when the yield curve is steep, they are likely to demand $\frac{1}{2}$. *Term reverses*, which are typically done for a period ranging from one to six months, may or may not permit substitution. An *open reverse* is normally initiated by a dealer to cover a short, and there is no right of substitution; the closing of such a reverse is determined by the borrower of securities: either he buys the securities he's short at a profit, or he says, "I've made a mistake," and closes out his short at a loss.

For a bank or an S&L that has securities a dealer wants, an alternative to reversing out these securities would be to do a straight loan—give the dealer the securities, take in other securities as collateral, and pick up a borrowing fee. This second alternative is less attractive if the institution wants cash, which it may if it anticipates a rise in interest rates.

Most states and municipalities are strict investors of cash. They will do repos but not reverses. There are some municipalities that will lend out securities in their portfolios; the majority, however, either doesn't have the right to do so or doesn't understand the transaction.

Risk and Liquidity

There is no liquidity in a term repo; it is not an asset that can be sold, and the underlying agreement cannot be broken. Thus, one might argue, as some have, that banks and S&Ls that put securities in their liquidity portfolios out on term repo are impinging on their liquidity. In all probability, however, they are not. Most of the time they are reversing out securities that they would in almost no circumstance consider selling. Also, if worse comes to worse, they can raise cash by selling or repoing the asset they have acquired as the other leg of the arbitrage.

One real risk in this game is that an unsophisticated portfolio manager might, when the yield curve is steep, buy long bonds as a basis for arbitrage and not realize how great a price risk he's assuming. Buying longer maturities and repoing them can look attractive to a small investor, but if interest rates rise, these investors could incur capital losses that exceed the money they earn arbitraging them. Note that risk arises here

because the securities are purchased as part of an arbitrage rather than as a long-term investment.

Brokering of Reverses

Reverses—other than those done by dealers as part of their matched book—are often proposed to an institution by a broker who, because his firm brokers a range of money market instruments, is in a good position to point out attractive arbitrage opportunities—to provide “one-stop shopping.” A broker of such reverses is a salesman as opposed to someone who is just fast on the phone; he has to convince the customer to take in money and then to put it out elsewhere.

“We do not,” commented one such broker, “just go in and say: ‘Hi, 10, 30, 60 days at 30, 45, and 55. Do you want to do \$25 million?’ We have to show people a reason to do a reverse. To be a good reverse broker, you have to know as many alternative uses as possible for money, to have a working knowledge of and a feel for more areas than in any other money market job.

“You do not just walk in and do a trade with a guy, and you do not take no for an answer. There is some rate at which a trade will go. To put together a trade on which you make money takes time and work. You have to know what your customer can do in terms of investments and what the lender is going to demand in terms of margin. Every trade that is agreed upon with respect to amount and rate is done subject to *pricing*.⁹ Different accounts demand different amounts of margin. Sometimes we can’t get a trade off because the two sides are half a point away on the pricing. If we get in a bind on pricing, we just start all over again.”

In the brokers’ market for repo and in the market in general, trades are agreed upon for round-lot sums, for example, \$30 million. Then the precise amount of the loan is calculated, taking into account pricing and the way the agreement is set up. Thus, on a \$30 million trade, the dollars lent might be more or less than \$30 million.

Reverses to Maturity

Some bank portfolio managers are loath to sell high-coupon securities that are trading at a premium and recommit their funds to another instrument

⁹ *Pricing* refers here to the value that will be assigned to the securities reversed out. Margin is created for the lender in a reverse transaction by pricing the securities below market value plus accrued interest.

because, if they sell these securities, they will reduce the interest income they are booking. The repo market gives the portfolio managers a way to get around this predicament.

One dealer gave an illustration, “Say a bank owns the 6¼s of Feb 2007, which have nine months to run. If the portfolio manager sells them, she won’t be able to get a comparable coupon, so she refuses to sell. What she can do, however, is to put these securities out on repo until maturity, book the interest income on them, and use the cash she has generated to invest in some other attractive instrument.”

THE SPECIFIC ISSUES MARKET

Dealers go short for various reasons: as a speculation, to hedge a long position in a similar security, or to reduce their position so that they can make a big bid in a coming Treasury auction. The theory behind going into an auction short is that the new issue will, until it’s distributed, yield more than outstanding issues; that, however, doesn’t always occur when the Treasury is paying down its debt as it sometimes does on a seasonal basis. Whatever his motivation may be, a dealer who shorts a given issue has to obtain those securities somehow to make delivery. Normally, he does so by reversing them in rather than borrowing them.¹⁰ Some widely placed issues are easy to find. Others he must hunt up on his own or with the help of a firm that brokers reverses.

The Borrowers

The market for reverses to cover shorts is often referred to as the *specific issues* or *special collateral repo* market because dealers shop in it for specific issues. Typically, a dealer won’t find another dealer who has the particular issue he needs and who also wants to finance it for some period. So dealers are only a minor supplier of collateral to the specific issues market. There is also a second reason for this. Said one dealer, “I deal in specific issues only for myself. I will give them to some of my dealer friends but only because they will do the same for me. I try not to support the market for specific issues because I know that, if I give a guy \$100 million of a security, he is shorting them and that is going to drive

¹⁰ The economics of reversing in securities are discussed below.

the issue down. So all I am doing is hurting myself. If I can get an issue that is likely to be shorted in the future, I will hold it for myself.”

The major suppliers of securities to (borrowers of money in) the specific issues and the general reverse markets are banks. This accounts for the fact that the top banks in the country, and in particular the top New York and Chicago banks, often borrow substantial sums from the dealers. Because banks reverse out, especially via their trust or custody departments, many securities to dealers, their net loans to dealers are much smaller than their total dealer loans.

S&Ls and certain other financial institutions are also large suppliers of collateral in the specific issues market. So too are foreign entities, a few municipalities, and a few corporate portfolios. Reverses are, as noted, not well understood except by those who do them, so it isn’t surprising that one corporate portfolio manager commented, “I reverse out securities to dealers, but I *never* refer to it around the company as ‘lending out’ our valuable securities.”

The interest rate on special collateral repos is known as a *specials* rate. When it is low enough, it provides an incentive to the holders of Treasury securities to borrow money via repo to capitalize on the yield difference between the repo rate and the rate that could be earned by investing any monies borrowed. For example, if the specials rate on a particular Treasury security is at 2% and the general collateral rate is at 3%, an investor could thus earn a 100 bp spread by borrowing money at 2% (via a specials repo on that security), and lending the same funds at 3% (via a general collateral repo). (See Figure 13.7.)

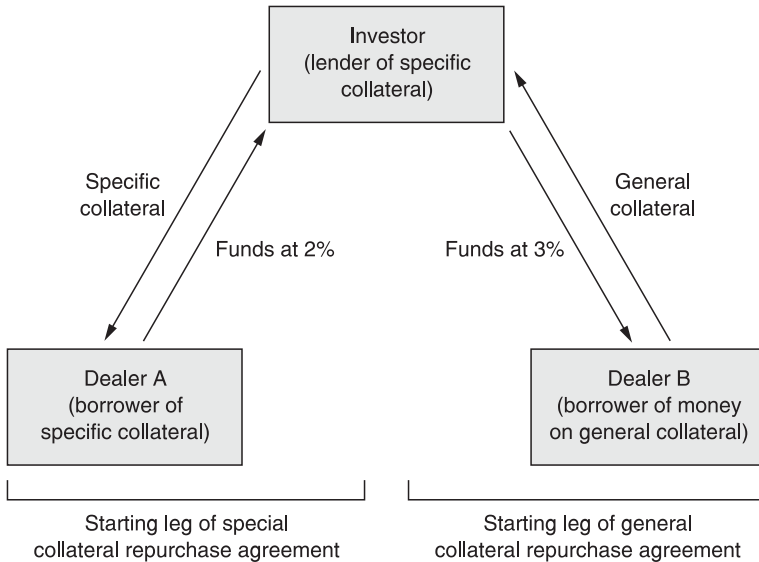
Reverses in the specific issues market usually have a term ranging from a week to a month. Activity in this market is greatest during a bear market because dealers increase their shorts in a declining market. On the other hand, when there are a number of issues on special, it could be a sign that market sentiment has become negative enough to be a harbinger of a rally in Treasury prices.

The Reverse Rate

When a dealer lends out money as part of a transaction in which it is reversing in securities to cover a short, the rate the dealer gets on its money is often significantly *less than* the going rate for financing general collateral, with repo. “The rate on a reverse depends,” noted one dealer, “on the availability of the securities taken in. In the reverse market, there are no

FIGURE 13.7

An investor lends collateral (and borrows money at 2%) on a special collateral repurchase agreement with Dealer A and relends the money to Dealer B on a general collateral repurchase agreement at 3%



Source: Federal Reserve Bank of New York

standard rate relationships; it's entirely a question of demand and supply." When an issue is *hot*, when it is on *special*, the reverse rate on it can vary a great deal throughout a given day and from day to day. A bank that holds a hot issue can reverse it out at a low rate and invest the proceeds by selling fed funds at a higher rate, making profit on the arb. This is why when investors select an issue, they consider not just its coupon, maturity, and liquidity, but they consider whether it might become a hot issue in the repo market. There's even the possibility that the demand for a security becomes so hot that those looking to borrow the issue would be willing to lend money at negative interest rates.¹¹

¹¹ Michael J. Fleming and Kenneth D. Garbade, "Repurchase Agreements with Negative Interest Rates," Federal Reserve Bank of New York, *Current Issues in Economics and Finance*, April 2004.

The Brokers

Dealers who want to reverse in a specific issue will often turn to a broker of reverses. The brokers make it their business to know where various special issues are and at what rate they might be available. A repo broker acts in effect as a commission salesperson for the dealers; if he finds bonds, he earns a commission or a spread; if he does not, he is paid nothing for his trouble.

The brokers try not to take bonds from one dealer and give them to another. The dealers talk to one another and could arrange trades of this sort themselves. As a rule, the brokers will try to pull specific issues out of regional banks, S&Ls, and other smaller portfolios. In doing so, they are using their own special knowledge and thus providing a real service to the dealers.

When they have arranged a trade, some brokers of repo will give up names to the institutions on both sides of the trade, charge both sides a commission, and leave it to them to clear the trade. Other brokers act as a principal in transactions they broker, taking securities in on one side and lending out money on the other. In doing so, a broker is acting as a credit intermediary, and he incurs risk on both sides of the transaction. Brokers who act as principals in repo and reverse trades are, like all participants in the repo market, extremely careful to deal only with institutions whose credit they know to be unimpeachable.

When a broker acts as a principal in a reverse transaction, he works for whatever spread he can get; normally it ranges from an 01 to $\frac{1}{8}$. If, however, the broker finds a firm that wants to repo stock collateral and another that wants to borrow the same collateral as a special, he might be able to earn more than that.

BORROWING VERSUS REVERSING IN SECURITIES

We have said that a dealer who is short governments can either reverse them in or borrow them. There are pros and cons to each procedure.

To begin, we make a simple and very helpful observation: in a securities lending, the investor swaps collateral for collateral; in a reverse, he swaps collateral for money.

Reversing in Securities

Generally, a dealer will reverse in securities on an *open* basis, which means that the transaction can be terminated at the request of either party; and, if

the party wanting to terminate the transaction calls before 11 a.m., the securities become returnable the same day. Most securities lending programs operate this way, but some have requirements for next-day termination.

Sometimes, a dealer will do a *term* reverse: take an issue that it thinks—hopes—will become hot and tie it up on term for at least a week. Often the trader who does this is speculating that the issue will become hot, be shorted by traders, and therefore become *tight* in supply. If this occurs, the issue becomes *special*: an issue that is in such demand that it can be reversed out (used to borrow money) at a rate below—perhaps full points below—the repo rate. The trader who wins on such a speculation ends up lending money, when he reverses in securities, at a rate well above the rate at which he borrows money when he subsequently reverses out those same securities. In other words, he ends up earning a positive spread on a two-legged arbitrage.

Borrowing Securities

When a dealer borrows securities, it is often from a very conservative portfolio that wants full protection from risk. The standard arrangement is that the dealer borrowing, say, \$25 million of Treasuries gives the lender of securities \$25.5 million of other securities as collateral for his borrowing. It also pays the lender of securities a fee, which can vary, but is usually not higher than 50 basis points.

A special aspect of a borrowing of securities is that the margin resembles that on a repo, but it goes to the lender not of money, but of securities. The reason that the borrower of securities ends up becoming the giver of margin is that the transaction is driven by his need to borrow securities. A dealer, if he wants to have a viable program for borrowing to cover shorts, must be able to go to an institution holding securities and say, “Look, if you will lend me your bonds, I will make that an extremely safe and attractive transaction for you. I will pay you a fee of 30 bp so that you don’t have to worry about arbitrage, market conditions, reinvestment, timing, moving monies, and so forth. Also, I will give you protection in the form of collateral equal to 102% of the value of the bonds you lend me; and I will maintain that 102% level of collateralization over the life of the transaction.”

Which to Do and Why

Some years ago, the market swung in favor of reverse repos over borrowing securities. The primary advantage of a reverse repo over a borrowing of

securities is that a reverse is operationally simpler: a reverse requires only *one* delivery of securities, whereas a borrowing requires *two* deliveries. Just the same, both types of transactions depend on the particular circumstances under which a deal is struck.

Normally, an investor dealing directly with a dealer won't want to go to the bother and cost of doing a reverse unless he can pick up at least 25 bp on the deal. Often, an investor holding securities has an arbitrage lined up where he expects to get at least a 25 bp spread between the rate at which he borrows money from the dealer and the rate at which he can invest that money. Such an investor will want to reverse out, rather than lend, securities to a dealer. In the alternative case, the investor says, "Give me collateral, not money, and I'll take my 25 bp as a fee." Some investors won't do reverses because they lack reinvestment capabilities and don't, therefore, want cash.

Some investors are set up both to reverse out and to lend securities. They will go the reverse route if the spread on the arb is more than 25 bp. If it is not, they will go the securities-lending route.

A dealer wanting to cover its shorts must be prepared to go both ways, to reverse in securities or to borrow them. How a given deal is struck involves both an investor (who holds securities) and a dealer (who wants securities) responding to relative rates and to availability in deciding what they want to do.

Since a lot of borrowing of securities by dealers is done to prevent "fails to receive" from creating "fails to deliver," a lot of dealers borrow securities from other dealers just before the close of Fedwire at 3:15 p.m. (ET), or during the *reversal period* [at the end of the day, banks are given a 15-minute period until 3:30 p.m. to return any incorrect deliveries that may have been made to them, and they have until 4:30 p.m. (ET) to move their securities among their securities accounts].

Dealers caught in a pinch can also reverse in securities from the Fed.

MATCHED BOOK

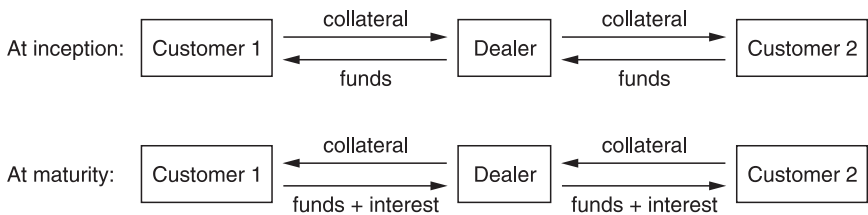
Dealer positions are obviously unlikely to match completely, with the maturities of their positions differing. Figure 13.8 illustrates a matched book transaction.

Fed Statistics on Dealers Repos and Reverses

Today, the running of matched books has become a big business, one that accounts for many billions of dollars of the assets and liabilities on the

FIGURE 13.8**A dealer's matched book transaction**

A dealer's matched book transaction involves simultaneous offsetting repo and reverse transactions. From Customer 1's perspective the transaction is a repo, while from Customer 2's perspective the transaction is a reverse. The dealer collects a fee for the intermediation service by keeping some of the interest that Customer 1 pays.



Source: Federal Reserve Bank of Atlanta

books of every major dealer. While no statistics are collected on matched books per se—a feat that would be difficult, since different dealers tote up different things in measuring their matched books—Fed statistics on dealer repos and reverses are revealing (recall Figure 13.3). These statistics show that the reporting dealers were, on an average day in the first quarter of 2006, borrowing in the repo market \$3.38 trillion, while at the same time, they were lending in the reverse market \$2.29 trillion.

Those big numbers reflect two things. First, dealers were running huge matched books. Second, in March 2006, dealers were borrowing money to fund other activities including their holdings in fixed-income securities. Data from the New York Fed, which collects such statistics on a weekly basis, show that dealers were short \$113 billion Treasuries, but long other types of securities: \$185 billion of corporate securities; \$98 billion of agencies; and \$31 billion of mortgage-backed securities.

Functions of Matched Book

Strictly speaking, *matched book* refers to a dealer's lending and borrowing against identical securities. In practice, however, dealers tend to regard a wider range of transactions as part of their matched book. Also, dealers have learned to *mismatch* their *matched* books: to mismatch asset and liability maturities in their books in order to turn those books into a play on the direction of interest rates. The upshot is that a dealer's repo desk

may regard its “matched-book” responsibilities as comprising as many as five distinct things.

Financing the Dealer's Position

Typically, a dealer's repo desk is first responsible for financing as much of the dealer's long position, normal inventory plus trading positions, as possible. For dealers, repo is the cheapest money around; the overnight repo rate on government collateral is normally a spread *below* the fed funds rate, whereas the dealer loan rate at New York clearing banks is a spread *above* the funds rate. Most big dealers work the repo market hard, financing there every bit of inventory they can. A good dealer will finance at this clearing bank at its posted dealer loan rate only odds and ends that cannot, often because of transaction costs, be economically repoed.

Sometimes a trader will borrow (or reverse in) securities not because he is short those securities, but because he thinks he might want to short those securities in the future as the market breaks; if he does this, he will cover his cost of borrowing (recoup the money he has lent) by relending (repoing) the securities he has taken in until he decides to short them. Running a matched book gives a dealer tremendous flexibility.

Covering Shorts

A second responsibility of a dealer's repo or matched-book desk is to cover the dealer's shorts by reversing in securities what the dealer then uses to make good delivery of securities that it has sold, but does not own. When a dealer does a reverse to cover a short, its obvious objective is to obtain control over a specific amount of specific collateral.

A reverse to cover a short contrasts sharply with most repos. Normally, control over collateral is not a key element in a repo trade; the lender of money demands collateral only to limit its credit risk, and any concern the lender has over which collateral it gets, bills or 30-year bonds, exists only because of a credit-risk concern.

Acting as a Financial Intermediary

When dealers moved from using repos simply to finance their positions to using repos to run matched books, they took a giant step: they diversified in a big way into a new-to-them business, financial intermediation. A *financial intermediary* is an institution that (1) solicits funds from funds-surplus units in exchange for claims against itself and (2) passes on those funds to funds-deficit units in exchange for claims against the

deficit units. Banks, S&Ls, credit unions, life insurance companies, mutual funds, and other financial institutions are all financial intermediaries; so too is a dealer to the extent that it does matched book.

The matched part of matched book is taking in collateral (any collateral will do), hanging out that collateral on the other side, and “taking the middle.” Borrowing funds at one rate and relending them at a *higher* rate to earn a spread—that’s what dealers running matched books do—is pure and simple, for-profit financial intermediation. This is illustrated in Figure 13.8.

Primary dealers include among their ranks firms such as Lehman, Goldman, and Merrill, who can borrow with ease many billions of dollars apiece in the national repo market. The big lenders in the repo market know the names and the credits of these dealers; and they are happy to deal with and make secured loans to them. The same is not true for many other would-be borrowers in the repo market: small dealers, small banks, and S&Ls.

The aversion of short-term portfolio managers to credit risk combined with the desire of many smaller institutions to borrow in the repo market created the opportunity for major dealers to become, as part of their matched-book operations, credit intermediaries.

Actually, large dealers assume little credit risk in lending, in part, to smaller borrowers. These dealers are protected not only by their credit departments, but, more importantly, by the collateral they require borrowers to deliver to them and by their practice of taking and monitoring margin.

Capturing the middle is not the only benefit a big dealer gets from providing repo money (via reverses) to smaller institutions. Large dealers get additional business, trading and retail, from the smaller dealers and financial institutions to whom they provide credit.

Matched Book as a Facilitation Device

Over the years, as their matched books made dealers in effect a source of credit, one function of their matched books became to facilitate sales of securities by providing credit to would-be buyers. Here’s an example. An investor wants to bolster its earnings by adding to them some positive carry. So it buys mortgage-backed securities, which yield more than Treasuries, reverses them back to the selling dealer, and earns the difference between the yield on them and the reverse rate. This can be dangerous, because the investor is assuming a lot of price risk to earn just a little carry.

Generating Borrowed Funds

It used to be that dealers running a matched book regularly did trades in which they borrowed on the repo side as much as half a point or more than

they lent on the reverse side. A well-run matched book could and did generate borrowed funds for the firm that ran it. Today, however, that has changed. Years ago there were well-publicized losses that investors in repo sustained, forcing big investors in repo to demand, even when dealing with highly creditworthy dealers, more margin than they did when the spread between rate on repos and reverses was wider than it is today. Also, dealers realize that, in some cases at least, the more margin they give a customer, the lower the repo rate the customer will require.

Profit on a “Matched” Matched Book

If a dealer repos out securities for the same period that he reverses them in (for example, hangs out on repo for 30 days any collateral he reverses in for 30 days), he is running a “matched” matched book: he has no mismatch of maturities. Spreads on matched-maturity repos and reverses are very narrow—less than 10 bp, but a dealer doing such trades can make money by doing a large volume of them. Also, he can live with a small spread because he incurs no interest-rate risk and only minimal credit risk.

TRADING COLLATERAL—MISMATCHING THE BOOK

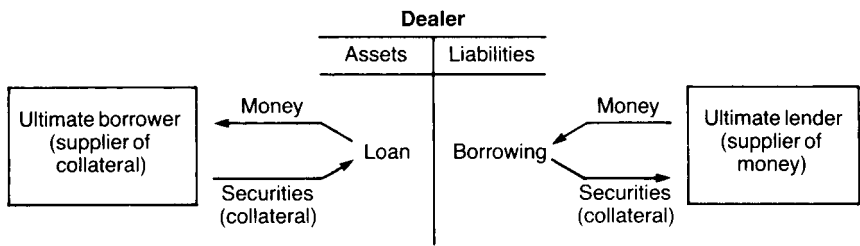
Money market dealers have long used standard, cash-market instruments to establish bets of various sorts. They have gone long money market instruments when they were bullish; used bills to establish tails; put on arbs in the government market; and so on. Matched book gave them yet another game to play, “trading collateral” of different maturities—*mismatching their books* in bankers’ parlance.

To understand what’s involved, one must visualize precisely what it means for a dealer to run a book in repo. Part A of Figure 13.9 shows the flows that occur when a dealer reverses in securities on one side and repos them out on the other. As we’ve said, the essence of a repo transaction is *not* that securities are being sold, but that *secured loans* and *borrowings* are being made. If the securities “sold” are thought of simply as *collateral*, it becomes clear that, when a dealer takes in securities, he is making a *loan* that is an *asset* to the dealer; *and* when he repos these same securities, the dealer is creating a *borrowing* that is a *liability* to him. Thus, a dealer’s book in repo and reverse consists of a collection of collateralized loans and borrowings (part B of Figure 13.9). All these loans (assets) and borrowings (liabilities) are, moreover, *fixed in term* and *fixed in rate*.

FIGURE 13.9

Running a book in repo and reverse

A. Reversion in securities and repoing these securities creates a new asset and a new liability on a dealer's book



B. The dealer's book in repo and reverse

Dealer	
Assets	Liabilities
Collateralized loans of varying maturities	Collateralized borrowings of varying maturities

The real money to be made in running a “matched book” comes from *mismatching* the book with respect to maturity. By adjusting the maturity of the loans and borrowings in its matched book, a dealer can *contrive* bets on future interest rates that expose the dealer to pure *interest-rate risk*.

For example, a bullish dealer, anticipating a fall in rates, might reverse in the 2-year note for 60 days and do a 30-day repo against that position. If its interest-rate forecast proves correct, the 30-day financing rate will be lower 30 days hence, and the dealer will make money. The dealer in this instance does not have market risk because it does not own the 2-year note; instead, it has interest-rate risk which derives from a possible rise during the initial 30-day financing period, not in the yield to maturity of the 2-year note, but in the 30-day financing rate. On a matched-book trade, the interest-rate risk created is only occasional, and then only by accident, close to—it’s *never* identical to—the market risk associated with holding the underlying collateral.

In this example, the bullish dealer is taking in *long collateral* relative to the repos it puts on. Having long collateral differs from having long securities in several ways. A long position in Treasuries can be sold at any time, whereas a long position in collateral can't be. Also, being long Treasuries creates market risk specific to the securities that are held.

The flip side to having long collateral is to have *short collateral*, reverses that are short in maturity relative to one's repos. For example, a bearish dealer might reverse in securities for 30 days and do a 60-day repo *with a right of sub*; in this case, the dealer's risk is that 30 days from now, when it must again reverse in 30-day collateral to complete its trade (when the dealer must substitute new collateral for "maturing" collateral), it will find that the 30-day reverse rate, which it is going to earn on the tail of its trade, has *fallen*, not *risen*.

The position in money market instruments equivalent to having long collateral would be a *forward short* created by a *forward short sale* of securities. Most money market paper, such as BAs, is heterogeneous; consequently, the only money market instrument a bearish trader can short is bills. An advantage of using a matched book to create bearish bets is that a dealer can create such a bet using any money market instrument as his underlying security in the trade.

Profit in Trading a Mismatched Book

Trading a *mismatched* book in repo and reverse is a trickier game to understand and to play than is trading bills and agencies, for example. Also, the matched-book trader has the advantage, which traders in these other instruments do not, of being able to short the market when he is bearish by lending money short term and taking in collateral for a longer term. For both of the above reasons, the profits to be gleaned from running a mismatched book are high when a trader is good at the game. Noted one such trader, "In every place I have worked, I have traded matched book like any other money market security, and my book has always been the most profitable individual item for the firm except for trading Ginnie Maes."

Growth in Matched Book

The figures in Table 13.1 on dealer's positions, repos, and reverses are revealing. The net short positions that dealers take in Treasuries, together with the net long positions they take in agency, corporate, and mortgage-backed

TABLE 13.1

Primary dealer positions as of May 24, 2006 (in millions of dollars)

Type of Security	Net Outright Position
<u>U.S. Government Securities</u>	
Treasury Bills	-17,347
Coupon Securities	
due in 3 years or less	-38,798
due in more than 3 years but less than or equal to 6 years	-45,458
due in more than 6 years but less than or equal to 11 years	-34,564
due in more than 11 years	-17,483
Treasury Inflation-Indexed Securities (TIIS)	2,070
Total U.S. Government Securities	-151,580
<u>Federal Agency and Government-Sponsored Enterprise Securities</u>	
Discount Notes	56,188
Coupon Securities	
due in 3 years or less	40,685
due in more than 3 years but less than or equal to 6 years	13,651
due in more than 6 years but less than or equal to 11 years	4,756
due in more than 11 years	7,048
Total Federal Agency and Government-Sponsored Enterprise Securities (excluding Mortgage-Backed Securities)	122,328
<u>Mortgage-Backed Securities</u>	35,605
<u>Corporate Securities</u>	
due in 1 year or less	37,732
due in more than 1 year	159,956
Total Corporate Securities	197,688
Note: The net outright position includes all U.S. government, federal agency, government-sponsored enterprise, mortgage-backed, and corporate securities scheduled for immediate and forward delivery, as well as U.S. government securities traded on a "when-issued" basis between the announcement and the issue date.	

Source: Federal Reserve Bank of New York

securities, contrast sharply with the huge amounts of repo and reverse, term and overnight, that they do. Dealers' matched books are big, and they have been constantly growing.

FED USE OF REPOS AND REVERSES TODAY

From insignificant beginnings, repos and reverses have grown over the past few decades to be a key part of the Fed's open market operations.

The Tools of Open Market Operations

Whenever it buys securities or does repos, the Fed adds to bank reserves, and this is so regardless of who its counterparty in the trade is. Conversely, whenever the Fed sells securities or does reverses, it drains bank reserves.

The New York Open Market Desk

The Federal Open Market Committee (FOMC) in Washington sets, at its eight meetings per year, the targets to be pursued by the Fed in its open market policy. The FOMC issues its directive to the open market desk of the Federal Reserve Bank of New York, directing the desk to foster conditions in the banking system—specifically with respect to the level of bank reserves—that are consistent with maintaining the federal funds rate at a level close to the target rate that the Fed decides upon at its meetings.

Over time, the Fed has accumulated a large portfolio of Treasury securities, amassing \$759 billion by June 2006 through outright purchases of securities designed to create permanent bank reserves (Table 13.2). The Fed also had on its books \$18.25 billion of repos it had done to create temporary bank reserves.

Influencing Bank Reserves

In implementing the FOMC's directive, the desk has two jobs. First, as the economy grows over time, a secular increase in bank reserves is required to prevent upward pressure on interest rates and to permit adequate growth of money supply. One job of the desk is thus to add slowly to the permanent supply of reserves available to banks. Doing that job alone doesn't

TABLE 13.2

The Fed's system open market holdings as of May 31, 2006 (in thousands of dollars)

Security Type	Total Par Value (\$)
U.S. Treasury bills (T-bills)	275,369,806
U.S. Treasury notes and bonds (T-notes/T-bonds)	460,849,553
U.S. Treasury inflation-indexed securities (TIIS)	22,646,087
Total SOMA holdings*	758,865,446

*Does not reflect inflation compensation of \$3,545,453.

Source: Federal Reserve Bank of New York

require that the Fed be in the market often, as evidenced by the very few times that the Fed has added permanent reserves in recent years.

However, bank reserves are influenced not only by the Fed's actions, but by various *operating factors* such as the size of Treasury balances at the Fed, the amount of currency in circulation, Federal Reserve float, high concentrations of securities settlements, and the size of foreign central bank balances at the Fed. These operating factors constantly fluctuate by sizable sums, so if the Fed did nothing to offset them, the amount of reserves available to banks would also fluctuate, often unpredictably. To prevent this, the Fed tries to offset fluctuations in the operating factors.

An increase in certain operating factors (e.g., Treasury balances at the Fed, currency in circulation) *drains* bank reserves, whereas an increase in other operating factors (e.g., float) *adds to* bank reserves. Thus, to offset the impact on bank reserves of a rise in Treasury balances, the Fed might do billions of repos. Conversely, to offset the impact on bank reserves of a rise in float or of a seasonal decline in currency in circulation, the Fed might do reverses, although as we noted earlier, reverses are rarely done.

The Advantages of Doing Repos and Reverses

To offset fluctuations in operating factors, the Fed needs to take temporary tactical actions. We emphasize "temporary," because most changes in operating factors that affect bank reserves are short-lived. It snows; checks do not move and clear; and float rises. The weather improves, and float falls. On Tuesdays, float increases because of a backlog of checks from the weekend. Float also increases in December and January because of

seasonal increases in the numbers of checks that are processed. The Check Clearing for the 21st Century Act, which was signed into law on October 28, 2003, and which became effective precisely a year later, has reduced the level of float by permitting banks to process check information electronically.

In theory, the Fed could offset the impact on bank reserves of all of the various short-term changes in the operating factors by doing *outright* purchases and sales of Treasury bills or coupons. The Fed, however, does not do this; instead, to make temporary adjustments in bank reserves, it uses repos, reverses, and *matched-sale purchases (MSPs)*; MSPs resemble reverses. Repos, reverses, and MSPs have proved to be much more versatile tools than outright trades for the Fed to use for temporarily adjusting bank reserves.

The Beginning: Matched-Sale Purchase Transactions

The Fed has been doing repos since the 1920s. In contrast, it devised MSPs only in the late 1960s. Someone on the desk described the Fed's first matched-sale purchase as follows: "The Fed did its first MSP because it anticipated an airline strike. A strike would cause bank reserves to rise, since checks, to be delivered by air, would not move and consequently would not clear. We tried to devise a transaction that would permit us to drain reserves on a temporary basis. We could not do what the market called a reverse repo because it looked too much like a borrowing. We had to do an outright sale of securities we owned. So we came up with MSPs, which we book as a sale of securities out of our portfolio."

Fed MSPs resemble, but are not identical to, Street reverses.

The Switch to Reverse Repurchase Agreements

On December 13, 2002, the Federal Reserve began using reverse repurchase agreements instead of MSPs. On the Fed's balance sheet, MSPs were counted as an outright sale of securities; reverse repos are booked as financing transactions in which the securities pledged remain in the Fed's tally of securities held. As we said, functionally, MSPs and reverse repos are the same, but it took many years for the Fed to decide that it had the legal authority to conduct reverses; for years the Fed's open market desk had operated on the belief that it could only conduct MSPs. Efforts to switch to using reverses instead of MSPs began in the late 1990s. Transcripts of comments delivered by Peter Fisher, the manager of the open market desk,

at the August 24, 1999, meeting of the Federal Reserve Open Market Committee (FOMC), show the verve that was behind the switch from the long-standing practice of using MSPs to using reverses instead:

Matched-sale purchases and reverse repurchase agreements are functionally equivalent transactions. But the prior view in the System had been that we were only authorized to do matched sale purchases and not reverse repurchase transactions. In recent years, as I think the various memos in your package explained, the evolving view was that reverse repos are within our authority. The dealers have for many years been strongly urging us to move from the matched sale paradigm to the reverse repo paradigm. Our outside auditors have been pressing us to do this. They are much more comfortable with the accepted market practice of reverse repos and would like us to get away from the involved accounting methodology used for matched sale transactions. The legal memos in the package suggest that the switch would be acceptable to our lawyers, though recognizing that it would be a change from a prior view.

MSPs versus Street Reverses

The substance of Fed MSPs is the same as that of Street reverses. However, the mechanics of the trades differ. Normally, dealers do reverses at a reverse rate they quote to customers. In contrast, the Fed does MSPs at the rate implied by those dealer bids of buyback rates that it accepts.

In addition, MSPs are treated differently on the Fed's balance sheet, as mentioned above.

A Repo Go-Around

When the Fed does a "go-around" for repos, it asks the dealers to bid a repo rate; to say, "We bid to do \$X million of repo with you at rate Y." Dealers, besides bidding for financing for their own positions, may also pass along to the Fed bids of their customers for repo money. Once the Fed has the dealers' bids, it "hits," starting with the highest bid, however many bids it must do the total of repos it wants to do. In other words, the Fed begins selling to dealers at the highest bids first. The lowest bid rate that the Fed accepts is known as the *stop-out rate*. Sample results from the Fed's Web site on one of its repo operations in May 2006 are shown in Figure 13.10.

An MSP Go-Around

When the Fed does a go-around for MSPs, it offers to sell to dealers one or several T-bill issues at the rates at which they are trading in the market.

FIGURE 13.10**Sample results of the Fed's open market operations**

Temporary Open Market Operations for June 07, 2006

Last updated: June 07, 2006 9:46 a.m.

Number of operations today : 1

Deal date: Wednesday, June 07, 2006

Delivery date: Wednesday, June 07, 2006

Maturity date: Thursday, June 08, 2006

Type of operation:^a Repo

Settlement: Same Day

Term of operation:^b 1 Day

Operation close time: 09:45 a.m.

Results

Collateral Type	Amount (\$ billions)		Stop-out ^c	Rate (%)		
	Submitted	Accepted		Weighted Average ^d	High	Low
Treasury	23.850	3.268	4.97	4.974	4.99	4.92
Agency	10.450	0.232	5.02	5.020	5.02	4.93
Mortgage-backed	2.600	0.000	N/A	N/A	5.02	4.98
Total	36.900	3.500				

^a Repo = repurchase agreement. Reverse RP = reverse repurchase agreement. MSP = matched-sale purchase (replaced by reverse RPs in December 2002).

^b Calendar day count (as opposed to business day count) between delivery and maturity dates. Repurchase agreements may be anywhere from overnight to 65 business days.

^c For repo, stop-out rate is the lowest rate accepted. For reverse RP, the stop-out rate is the highest rate accepted.

^d Weighted average refers to the weighted average rate of the accepted propositions.

It then asks the dealers to offer a rate at which they will resell the bills to the Fed. The Fed expects the dealers to set the buyback (repurchase) rates they offer so that they earn some reverse rate on the money they lend to the Fed. In doing MSPs, the Fed hits those bids that give it the lowest implied reverse rate. Remember, the Fed in this transaction is borrowing from the dealers.

For reverses, dealers no longer need to include reoffer rates; instead, they propose rates and a dollar amount for the financing they are offering.

Characteristics of Fed Repos

The Federal Reserve's repo operations have a distinct flavor that separates their repo trading from ordinary repo trading. Nevertheless, predictability is a key feature of Fed repos.

Term of Fed Repos

As we've discussed, the Fed mostly does overnight repo, and nearly all of its multiday repos are for 14 days. The reason that the Fed does such short repos is that short repos are the most flexible tools the Fed can use to deal with a highly variable and often difficult-to-forecast situation, namely, the ever-changing level of bank reserves. Moreover, the Fed has much more information these days from which it can calculate and hence adjust bank reserves to levels that bring the fed funds rate close to the target rate.

When the Fed does multiday repos, it will often do more than it really needs to because it anticipates that, before the repos mature, dealers will withdraw some of the collateral they delivered to the Fed at the start of the repo.

In August 1999, the Federal Reserve voted to allow repo transactions with maturities as long as 90 days, up from 60 days before the change. It was trimmed back to 65 days in September 2003.

Right of Substitution

When it does a repo for several days, the Fed permits the dealers to substitute collateral on the first day of the repo. The Fed realizes that the dealers may sell, unexpectedly, securities that they had said they would deliver to it, and the Fed wants to ensure that it does, regardless of such sales, the volume of repos it contracted to do in the go-around. Substitutions present onerous operational difficulties for the Fed, which is why the Fed does not permit substitutions on repos done with it.

Counterparties

Dealers are not the only counterparties that the Fed has in doing repos and reverses. The Fed has also done a lot of its reverses and MSPs with foreign central banks, and, since the mid-1970s, the Fed has permitted dealers to show customer money to it when it was doing reverses and customer collateral to it when it was doing repos. Many dealers' customers, however, are unaware of this possibility.

Transactions for the Accounts of Foreign Central Banks

Foreign central banks hold short-term balances of dollars for a number of reasons. One is that the dollar is a reserve currency, a currency that foreign central banks hold, instead of or in addition to gold, as part of their foreign-exchange reserves. Also, when the dollar is weak, some foreign central banks—chiefly the Bank of Japan—will buy dollars in an attempt to stabilize foreign-exchange rates.

The Fed offers to invest, in either bills or repos, any dollar balances that foreign central banks hold with it. Foreign central banks with long-term dollar balances often invest these balances in Treasury bills.

Normally, foreign central banks will have at least some temporary balances sitting at the Fed, funds that they will need in several days to make a payment. To permit foreign central banks to earn a return on such balances, the Fed offers them an investment facility: it permits them to invest dollars short term in a *pool of funds* that it in turn invests in the repo market by doing system reverses with dealers; investments in this pool pay a return determined by current repo rates. This pool tends to be relatively small, as we demonstrated earlier.

The Fed takes the expected size of the foreign-central-bank repo (a reverse to the Fed) pool to be an operating factor, like currency in circulation or Treasury balances. If the pool turns out to be larger than anticipated, that drains bank reserves and vice versa. Either eventuality may force the Fed to take additional action to hit its reserves target.

REGULATORY REFORMS AFFECTING REPOS

In the 1980s and 1990s, misdeeds in the repo and reverses market prompted increased regulation of the government securities market. Regulation of the government securities market began in 1987 when the U.S. Treasury adopted regulations to implement the Government Securities Act of 1986. The 1986 act was precipitated by the bankruptcies of a number of smaller dealers that cost investors hundreds of millions of dollars principally as a result of the failed dealers' misdeeds. Amendments to the act were enacted by Congress in 1993 following investigations by the Securities and Exchange Commission (SEC) and the Antitrust Division of the Department of Justice regarding apparent "short squeezes" that occurred after the April and May 1991 auctions of 2-year Treasury notes.

Dealer Safekeeping of Repo Collateral

At the end of the 1970s and in the early 1980s, there were numerous dealer failures, which resulted in large losses for investors doing repo and reverses. These losses were unnecessary and resulted almost entirely for two reasons: the switch to sloppy pricing of collateral and the failure of investors in repo to take delivery of collateral.

While delivery of collateral to the lender of money was common in the early repos done between big dealers and big investors, some customers, instead of taking delivery of repo collateral or even of securities purchased outright, long left such securities with their dealer for safekeeping.

Reasons for Dealer Safekeeping

Some dealers offer to safekeep securities for customers at no charge. One reason a dealer may do this is to nurture customer relationships by providing to his customers, at no cost to them, a service that they would otherwise have to buy. A second reason some dealers prefer, on overnight repos, to safekeep customer securities, especially physical securities, is that delivery would, relative to the interest paid on the repo, be costly to both parties. A third reason some dealers prefer to safekeep customer securities is risk of a subsequent failure. Dealers reason, "If I deliver out, as collateral for an overnight repo, \$20 million of bills to XYZ Corp., I must worry about whether XYZ will return my collateral tomorrow in time for me to redeliver it to another repo customer or to an outright buyer. If, alternatively, I safekeep, overnight, for XYZ his collateral, I know that, tomorrow when my repo with XYZ comes off, I'll have my bills in time to make good delivery of them to another customer."

Exempt versus Regulated Securities

In discussing dealer safekeeping, one must distinguish between regulated and exempt securities. The SEC legislation passed in the 1930s brought under federal regulation trading in corporate stocks and bonds, but not trading in most money market instruments. Today's roster of exempt securities comprises government and federal agency securities, BAs, CDs, commercial paper with an original maturity of 270 days or less, private placements, and municipal securities. Regulation of municipal securities is carried out by the Municipal Securities Rulemaking Board (MSRB),

not the SEC. Regulation of government securities is now carried out by the SEC, the Treasury, and bank regulators:

Regulated Securities. Any broker-dealer who deals in regulated securities is required by Rules 15c2-1 and 15c3-3 of the Securities Exchange Act of 1934 and by Article III Section 19(d) of the Rules of Fair Practice of NASD to hold all fully paid-for securities that it safekeeps for a customer in a denominated, segregated account in which the customer is afforded significant protection. In particular, a broker-dealer holding securities in such an account may neither hypothecate nor negotiate such securities unless it is specifically instructed by the customer to do so. Also, a customer who holds fully paid-for securities with a regulated broker-dealer for safekeeping may, at any time, demand immediate delivery of those securities.

Exempt Securities. Prior to passage of the Government Securities Act (GSA) of 1986, firms that dealt solely in exempt securities, including the *Government Securities, Inc. (GSI)* subsidiaries that some broker-dealers created to deal in exempt securities, did not have to conform to any rules with respect to the safekeeping of customer securities. With the passage of GSA in 1986, various rules and regulations, both new and existing, were applied to dealers in governments.

Fraud Associated with Dealer Safekeeping in the 1980s

In the early 1980s, a string of dealer bankruptcies shook the government market. While not all bankrupt firms used precisely the same techniques for getting their fingers into other people's pockets, a number of them discovered that unverifiable dealer safekeeping combined with the trusting nature of many of their smaller customers provided them with an easy means of generating, via various frauds, hundreds of millions of dollars to enhance their capital and to cover, sooner or later, their cumulative trading losses—losses that each firm had and that each firm earnestly hoped would vanish, if not today, then tomorrow.

It is likely that no dealer in government securities ever set up shop specifically to make a living from defrauding his customers. Probably in every case, a dealer who eventually engaged in fraud started out intending to make money running an honest business; then, because of his incompetence and/or a few unfortunate bets he made on the market, the dealer lost money and ended up broke. At that point, he succumbed to the temptation

to reason, “I’m bankrupt at the moment, *but*, if I just borrow from customers for a little while, I can recoup my losses.” And, thus, started the fraud, the creative accounting, and the deceit.

Full Accrual Pricing

High-profile dealer bankruptcies in the 1980s, perhaps because they caused a large loss to a particular bank (Chase), finally stirred the Fed to join in on the regulation of the government securities market. The Fed recommended, in a letter to the primary dealers, that they henceforth price repo collateral at market price *plus* accrued interest *minus* a reasonable haircut. Under this method of pricing, known as *full accrual pricing*, any coupon interest received by the holder of collateral is still transferred on the coupon data to the ultimate owner of the securities serving as collateral; for high-coupon securities repoed with a lot of accrued interest, this transfer leads to an offsetting adjustment in the dollar value of the repo loan, one that reflects the fall to zero in accrued interest on the repo collateral.

The Government Securities Act of 1986

The first repo agreement written by the Public Securities Association (now the Bond Market Association) was designed principally to protect the dealers. Meanwhile, investor losses resulting from failures of dealers in governments was creating a brouhaha in Washington. The upshot was the passage of the Government Securities Act of 1986. This act contained a number of provisions designed to protect customers doing repos and reverses with dealers.

Repos, Reverses, and Safekeeping

Several things were done by the Treasury and the SEC in their regulations to pare the risks associated with repos and reverses. In particular, both the Treasury and the SEC imposed complex capital charges on repos and reverses. One purpose of these requirements was to create incentives to encourage dealers doing repos and reverses to operate as follows: collateral is to be reasonably priced; the amount of money that changes hands is to be a reasonable percentage of the collateral’s market value; and, finally, margin calls are to be made if significant changes occur in that market value.

Also, the new regulations required that a dealer, before doing repo with a customer, send to the customer a written agreement that includes a specifically worded disclosure regarding the dealer's right to substitute collateral. A dealer must also send to a customer confirmations on all transactions, including repos and reverses. Also, a dealer *must segregate* in a safekeeping account at his clearing bank and on his books any customer securities, including repo collateral that he holds for customers. On hold-in-custody repos, a dealer, on his confirmations to customers, is supposed to list collateral separately—he can no longer write “various.” Also, the dealer is supposed to state the market value of the securities that he is giving to the customer as collateral.

The Federal Reserve is responsible for supervising the government securities broker-dealer activities of roughly three dozen state member banks and foreign banking offices for which the Fed is designated as the “appropriate regulatory agency” under the Securities Exchange Act of 1934. The Fed is also responsible for supervising the government securities custodial operations at hundreds of institutions that hold government securities for customers but do not engage in broker-dealer activities in government securities.

Short Squeezes of 1991 Prompt Reforms

Additional reforms of the government securities market were prompted following investigations by the SEC and the Antitrust Division of the Department of Justice into apparent short squeezes that occurred following the April and May 1991 auctions of Treasury notes.

Salomon Brothers admitted in August 1991 to having submitted unauthorized customer bids at several auctions in 1990 and 1991 and to failing to report large net long positions on auction tender forms as required. As a result of its actions, short squeezes developed in the 2-year Treasury note, with its repo rate on special and, hence, substantially below the repo rate on other Treasury securities. In response to the violations of auction rules, the Treasury, the SEC, and the Fed jointly reviewed the government securities market and issued a report containing policy and regulatory changes to prevent future violations, some of which were implemented immediately, while others were recommended for legislative approval.

A centerpiece of the reforms was an effort to make Treasury auctions more accessible to a wider variety of investors. For example, the new rules would allow all government securities brokers and dealers to submit bids, not just primary dealers and depository institutions. Another change was

the increase in the maximum allowable noncompetitive bid, which was boosted to \$5 million from \$1 million. This particular action was taken with the small investor in mind; noncompetitive bids were restricted to bidders having no positions in the when-issued futures or forward markets at the time of the auction and not submitting competitive bids.

Additional changes were made to the enforcement of auction rules including, for instance, spot-checking of bids by the Federal Reserve Bank of New York to ensure their authenticity, and confirming all large auction awards directly with the customer. Automation of the auction process was also set into motion and eventually implemented. Surveillance efforts were improved, and the Treasury stated its intention to reopen any security experiencing an “acute, protracted” shortage, an action designed to alleviate any scarcity of a particular Treasury issue.

Another important change that resulted was the switch to a uniform-price system from the multiple-price system that existed at the time. The joint report suggested that a uniform-price system might alleviate concern among some auction participants about bidding above where the majority of investors were expected to bid. By November 1998, all Treasury securities were auctioned using the uniform-price system.

Ultimately, Congress enacted the Government Securities Act Amendments of 1993, which, among other provisions, gave the Treasury the authority to require holders of concentrated positions to report on their positions if a shortage were to become apparent.

REPO AS A GAUGE OF DEALER LEVERAGE

We have shown that dealers use repos to finance their holdings of fixed-income securities. In light of this fact it would seem that the aggregate data on repos outstanding could then be used to track dealer leverage. In the 2000s, the number of repos outstanding has grown sharply, almost tripling between 2000 and 2006 to roughly \$3.5 trillion. These data appear to suggest that dealer financing has increased sharply during the period.

Adrian and Fleming counter this simplistic analysis, arguing that dealer borrowing involving fixed-income securities grew only modestly in recent years and that the increase is unrelated to an increase in net positions held.¹² The researchers assert that while there has indeed been a

¹² Tobias Adrian and Michael J. Fleming, “What Financing Data Reveal about Dealer Leverage,” Federal Reserve Bank of New York, *Current Issues in Economics and Finance*, March 2005.

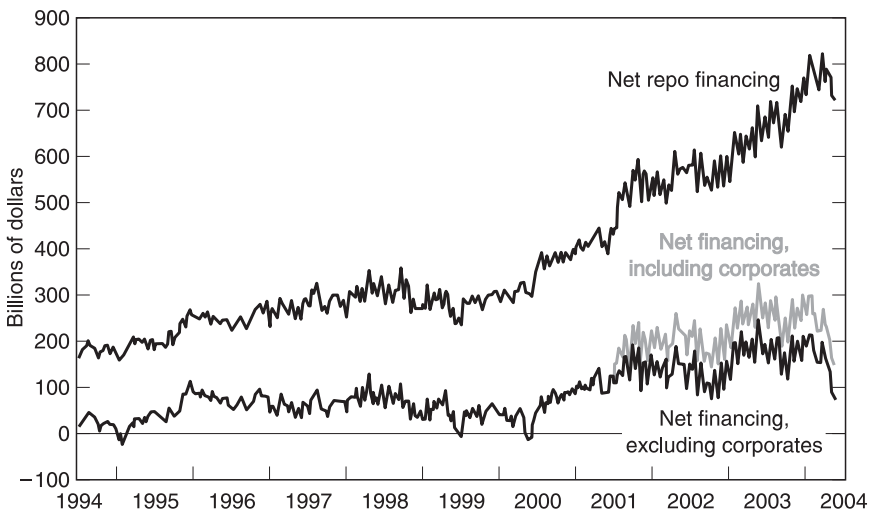
sharp increase in *net repo financing*—the net amount of money primary dealers borrow through repos on fixed-income securities (calculated as repos minus reverses)—net repo financing is an incomplete and potentially misleading measure of dealer leverage. One reason is that net repo financing does not include transactions that are essentially the same as repos but not reported as such. Another reason is the inconsistencies in the data series caused by changes in the mix of asset classes it includes. For example, corporate debt securities were added to the measure in July 2001.

Adrian and Fleming argue that a better measure of dealer leverage is *net financing*, which is measured as securities out minus securities in. Net financing measures the net amount of funds that primary dealers borrow through all fixed-income security financing transactions.

Figure 13.11 shows the sharp difference between the amount of net repo financing and net financing during the period 1994–2004. The chart suggests that net repo financing was boosted during the period by the exclusion

FIGURE 13.11

Net financing and net repo financing of primary dealers
(in billions of dollars)



Notes: The chart plots net financing ("securities out" minus "securities in") and net repo financing (repos minus reverse repos) by week from July 6, 1994, to May 19, 2004. The financing involves U.S. Treasury securities, agency debt securities, and mortgage-backed securities for the whole sample and, except where noted, corporate debt securities since July 4, 2001.

Source: Federal Reserve Bank of New York

of transactions that are essentially the equivalent of repos. Although the chart shows that the amount of dealer leverage seen during the period was considerably less than implied by the net repo measure, net financing increased during the period, too, albeit by a much smaller amount. It is notable that the increase in net financing occurred during a period of extraordinarily low interest rates, which suggests that interest-rate levels play a role in the motivation to increase or decrease dealer leverage.

Increases in dealer leverage do not necessarily imply greater risk-taking among the dealers for a number of reasons. First, it is possible for some of the increased leverage to be allocated toward positions that are hedged. For example, a dealer might buy 5-year corporate securities with borrowed funds but sell 5-year futures contracts, hence offsetting much of the interest-rate risk associated with the security. Second, leverage fails to take into account changes in the mix of securities a dealer owns. For example, a dealer could decrease his risk-taking without any change in his leverage by selling long-term maturities in favor of short-term maturities.

REVIEW IN BRIEF

- The repo market is one of the biggest sectors in the U.S. money market. In the first quarter of 2006, the average amount of repo and reverse agreements outstanding was close to \$5.67 trillion. Daily trading volume was \$1.6 trillion.
- *Repurchase agreements (repos for short)* are contracts involving the *simultaneous sale and future repurchase* of an asset, most often Treasury securities. One firm's repo is necessarily another's *reverse repurchase agreement*.
- Repo agreements have been standardized on a global scale. The two widely used forms of master repo agreements include the Bond Market Association's master repurchase agreement, and the global master repurchase agreement published by both the Bond Market Association and the International Securities Market Association.
- Traditionally on a repo transaction, the lender of money, because it is lending the more liquid asset, receives margin, known as a *haircut* in the repo market.
- Foreign central banks and other foreign investors are big investors in the repo market, having sharply boosted their presence between 2001 and 2005.

- The overnight repo rate is normally a bit lower than the fed funds rate, around 5 basis points.
- Dealers enter into *term repo* agreements to speculate—to create future securities they view as attractive.
- In 1998, a system called the *General Collateral Finance repo* (GCF Repo) service was created as a way to allow both the borrower and the lender of monies and securities to settle their daily transactions on a *net* basis, thus reducing transaction costs and enhancing liquidity.
- A *tri-party repo* obviates the need for delivery of collateral, while protecting the interests of the investor whose credit risk becomes that of a major bank rather than that of a dealer.
- *Net repo financing* can be a misleading gauge of dealer leverage; *net financing* is considered a better gauge.
- The market for reverses to cover shorts is often referred to as the *specific issues* or *special collateral repo* market because dealers shop in it for specific issues.
- The term *matched book* describes offsetting positions in repos and reverses that a dealer creates by matching his *reverses-in* of securities with *repos-out* of the identical securities.
- Repos and reverses have grown over the past few decades to be a key part of the Fed's open market operations. The New York Fed's open market desk carries out the Fed's directive on controlling the fed funds rate.
- Over time, the Fed has accumulated a large portfolio of Treasury securities, amassing \$756 billion by the middle of May 2006.
- Regulation of the government securities market began in 1987 with the implementation of the Government Securities Act of 1986. Amendments to the act were enacted by Congress in 1993 following violations of auction rules that caused the repo rate on some Treasury securities to fall substantially below the repo rate on other securities.

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Treasury and Federal Agency Securities

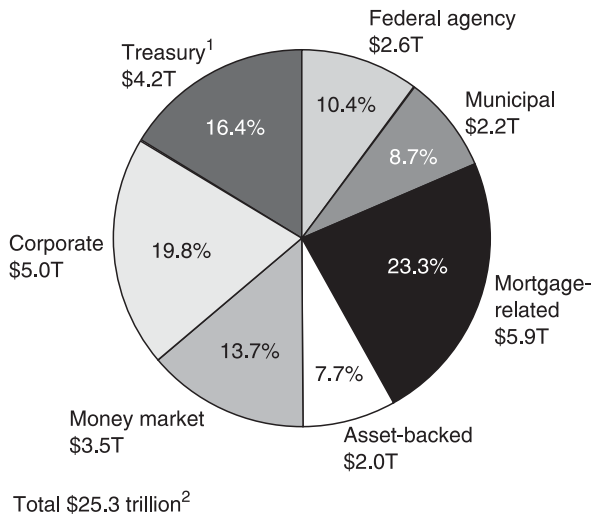
For most people, the bond market and U.S. Treasuries are synonymous. Public awareness of the Treasury market easily exceeds that of all other segments of the bond market. This is easy to understand when one considers the number of Treasuries that trade daily, the total amount of Treasuries outstanding, and the broad ownership of Treasuries. While the Treasury market is not the biggest segment of the bond market—the mortgage market is—Treasuries, which are issued by the U.S. Treasury Department, are by far the most active segment, and the Treasury Department is the single largest issuer of debt in the world and the world's most actively traded financial security.

U.S. Treasury securities are so prominent that their interest rates are used as a benchmark for interest rates throughout the U.S. bond market and the U.S. financial system and throughout the world.

As shown in Figure 14.1, there were \$4.2 trillion of Treasuries outstanding at the end of 2005, making Treasuries the third largest segment of the \$25 trillion bond market in terms of size. Many people might wonder why there are just \$4.2 trillion in Treasuries outstanding when the U.S. government has close to \$8.3 trillion of debt outstanding. There are two main reasons for this. First, approximately \$3.5 trillion in nonmarketable securities are held in a trust fund for various programs, particularly in the Social Security program. These trust funds are IOUs. Currently, approximately \$1.66 trillion are owed to the Social Security trust fund (called the Federal Old-Age and Survivors Insurance Fund) by the U.S. Treasury Department.

FIGURE 14.1

Outstanding bond market debt as of December 31, 2005
(in trillions of dollars)*



*The Bond Market Association estimates.

¹ Includes marketable public debt.

² Figures may not add because of rounding.

Sources: Federal Reserve System, U.S. Treasury, GNMA, FNMA, FHLMC, Bloomberg

These IOUs accumulated throughout most of the 1980s and 1990s as the government essentially dipped into the trust fund's yearly surpluses. The trust fund has been running surpluses for a number of years, as the population of people paying Social Security taxes has exceeded the population of people receiving Social Security benefits. The main reason for this relates to favorable demographics; a baby boom took place between the years 1946 and 1964, resulting in a large pool of taxpayers. The increase in the number of taxpayers has greatly exceeded the increase in number of Social Security recipients, resulting in large surpluses (as Baby Boomers retire, this dynamic will work in the opposite direction, carrying with it a bundle of economic, financial, and political ramifications). Through creative accounting and political will, the surpluses have been included in the yearly readings on the U.S. fiscal balance, producing smaller reported deficits and larger surpluses than have actually been the case, but the debts owed to the Social Security trust fund have been kept out of the public's eye.

The second reason why the total amount of publicly traded Treasuries differs from the U.S. government's total debt relates to the Federal Reserve. The Fed holds roughly \$736 billion of Treasuries for its own account and another \$1.127 trillion of Treasuries on behalf of so-called foreign official accounts. Foreign official accounts consist largely of foreign central banks. As is discussed in Chapter 9, the Fed has been accumulating Treasuries for many years to help it implement monetary policy. Thus, while the Fed's holdings are not included in the \$4.2 trillion tally of publicly traded Treasuries, they are nonetheless part of Uncle Sam's total debt *outstanding*.

It is important to keep in mind that there is a meaningful distinction between the total amount of *publicly traded U.S. Treasuries* outstanding and the total amount of *U.S. debt* outstanding.

The total amount of publicly traded U.S. Treasuries outstanding shrank for a short time, owing to several years of budget surpluses. The surpluses enabled the U.S. Treasury to reduce its yearly issuance of Treasuries from a peak of \$2.485 trillion in 1996 to \$2.001 trillion in 2000. Moreover, in 2000, the Treasury began a program to use the surplus to buy back previously issued Treasuries from the public, concentrating on high-yielding long-dated maturities. The Treasury hoped to save taxpayers millions of dollars in interest payments by reducing the public debt. In calendar year 2000, the Treasury repurchased \$30 billion of Treasuries, but it came to an end in 2001 when the budget surplus began to shrink and turned to a deficit by 2002 following four years of surpluses totaling \$558 billion.

AN ACTIVE MARKET INDEED

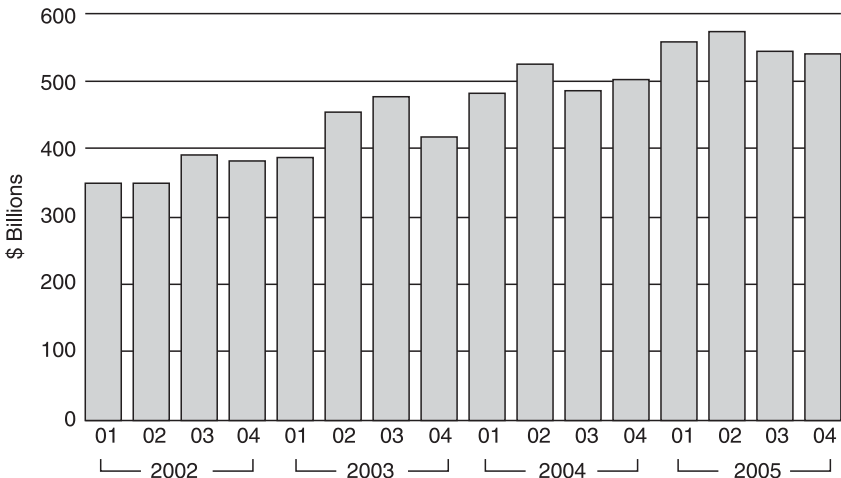
As mentioned earlier, U.S. Treasuries are the most actively traded securities in the world, making the Treasury market the most liquid financial market in the world. Treasuries trade literally around the clock and around the globe.

Investors are drawn to the Treasury market for its safety element. As obligations of the U.S. government, they are backed by the full faith and credit of the U.S. government and are therefore considered risk-free. Investors also drawn to the Treasury market for its deep liquidity and quote depth; large transactions of up to \$1 billion or more are commonplace in the Treasury market.

As shown in Figure 14.2, the daily average trading volume for all Treasuries by primary dealers from the first quarter of 2002 to the last quarter of 2005 was \$554.5 billion—a record. Volume surged in 2005

FIGURE 14.2

Average daily trading volume of U.S. Treasury securities* from first quarter 2002 to fourth quarter 2005 (in billions of dollars)



*Primary dealer activity.

Source: Federal Reserve Bank of New York

owing to a combination of factors, many relating to the eight interest rate hikes delivered by the Federal Reserve during the year. Also, the total amount of bond issuance increased compared to the previous year, a factor that tends to boost volume. Record amounts of foreign purchases of U.S. fixed-income assets also boosted volume. Over time, three of the biggest factors affecting trading volume in Treasuries include: the Federal Reserve, the state of the economy, and global economic and financial conditions.

Probably the most important reason why Treasuries are so actively traded throughout the world is that the U.S. dollar is the world's reserve currency. As such, with much of world trade denominated in dollars, the world's central banks as well as many private investors have dollars to invest. It's no wonder, then, that about half of Treasuries are held by foreign investors. Another factor that boosts Treasury volume is its transparency. Treasury prices are more transparent than any other fixed-income instrument, meaning that both the price and size of the bids and offers for Treasury securities are readily discerned. Moreover, the bid and offer

prices for Treasuries tend to be quite narrow relative to other fixed-income securities, which also boost their attractiveness. In fact, in a study the Federal Reserve estimates that the average bid-ask spread for Treasuries is roughly half the bid-ask spread for corporate securities (corporates). In another Fed study the average quote size for 3-month T-bills was \$16.9 million between December 1996 and March 31, 2000, based on data from GovPX, a company that consolidates data from all but one of the major brokers in the interdealer market. That was about double the quote size for 10-year notes, which actually had the smallest quote size of all of the major Treasury securities. Quote depth is extremely important to institutional investors, who can buy or sell up to a billion dollars or more of bonds in a single trade.

SOME HISTORY

The Treasury market has evolved over many decades to become the vibrant market that it is today. There are many reasons for this. In 1961, Congress amended the tax law so that bank capital gains, which had been taxed at the capital gains rate, were taxed as ordinary income. “Overnight, that change,” one dealer noted, “converted 6,000 stodgy bankers into portfolio managers who were supposed to make a profit.” At about the same time, tightening and easing by the Fed began to create wide swings in interest rates. This was a different environment for Treasuries, which had showed little volatility in prior years. The increased volatility made it possible for portfolio managers and dealers to make money positioning and trading government securities (governments).

Another stimulus to the development of the government market was the decision by the SEC to force stock exchange firms to negotiate commission rates. That change effectively cut stock house commissions by 75% so they began looking for something new to do. They searched just at the time big money was being made by dealers in governments, and many decided to open government bond dealerships. A few lost a lot of money, but a number prospered and stayed. To this day, profits related to fixed-income operations are often a substantial part of a dealer’s overall profits.

The huge and consistent growth of the federal debt has also contributed to the evolution of the government market by creating more supply and by attracting more players, both domestic and foreign, into the market. So, too, did the freedom in which the government market operated; ironically, the government market, unlike other securities markets,

was not subject to regulation until the passage of the Government Securities Act of 1986.

This act, which among other things imposed capital requirements on dealers in governments and restricted just how they might do repo, still left dealers with lots of room to innovate, something they had been doing for years. For example, over the last several decades, the development of the reverse market and the specific issues market has made transactions by dealers and portfolio managers now commonplace. Indeed, there were \$821 billion of overnight reverse repos outstanding in February 2006 compared to \$300 billion in 2000. The government market is one of the few markets in which it is possible to run large short positions—to make money on a negative attitude—and growth of the reverse market has made shorting simpler, cheaper, and more attractive. Also, introduction of trading in bill, note, and bond futures and options opened up a host of new strategies for dealing, investing, and speculating in governments; and it has attracted many new participants to the market.

A factor that probably boosted activity in the early 1990s was the failure of hundreds of savings and loan institutions. The failures created a new imperative for banks to avoid a repeat of the predicament, leading to an increase in bank holdings of government securities, including Treasuries and agencies. Bank holdings of government securities began to increase sharply in 1990 from just under \$400 billion to almost \$800 billion by the end of 1994. Banks held \$1.2 trillion of government securities as of March 2006, although their holdings of Treasuries had diminished over the several years prior owing to the low interest-rate environment that prevailed at that time.

Yet another factor in the evolution of the Treasury market is one with an odd twist. The U.S. trade deficit ballooned in the 1990s and early 2000s from a small deficit of under \$100 billion in the early 1990s to over \$700 billion in 2005. A widening trade deficit is normally seen as a negative for the bond markets of most countries, but in the United States the deficits arguably had benefits for the U.S. bond market. The reason is that the countries that were on the receiving end of those dollars—chiefly China and Japan—invested those dollars in Treasuries, which had the effect of producing lower interest rates than would otherwise have been the case, as well as increasing volume.

Finally, it was innovation by dealers that led the Treasury to introduce Separate Trading of Registered Interest and Principal Securities (STRIPS) and stripping of Treasury securities.

BILLS, NOTES, AND BONDS

Negotiable Treasuries come in three principal varieties: bills, notes, and bonds.

Bills

Treasury auctions began in 1929 with the sale of Treasury bills. From 1977 through 2005, bills as a percentage of Treasury debt outstanding averaged approximately 26%; currently bills are about 23% of total Treasury debt outstanding.

The Treasury currently issues bills in 1-month, 3-month, and 6-month maturities. In addition, the Treasury issues cash management bills from time to time depending upon borrowing needs. Except for holidays or special circumstances, the 3-month and 6-month bills are offered every Monday for settlement on the Thursday following the auction, and 4-week bills are sold on Tuesdays, for settlement on the Thursday following the auction. As with all other Treasuries, bills are issued in minimum denominations of \$1,000, and multiple purchases are also in denominations of \$1,000. A round lot in the interdealer market is \$5 million, and retail customers who buy bills from a dealer will get a quote somewhat off the market unless she bids for size. The Treasury was selling close to \$50 billion of bills each week in late 2006.

Bills used to be issued by the Treasury in the form of bearer certificates. The Treasury and the Fed then made it possible to hold bills in *book-entry* form (described below), and since 1986 the Treasury has offered bills in book-entry form only, meaning they exist only as electronic records in computers.

Notes

The Treasury currently auctions 2-, 3-, 5-, and 10-year notes on a regular cycle. It usually includes a 3- and a 10-year note during quarterly refundings. Table 14.1 provides more details on the issuance schedule for notes, which are available in book-entry form only.

In the interdealer market for notes, \$1 million is a round lot, although trades for much more than that occur routinely, and trades for even larger amounts are common. In a 2003 study, researchers at the Federal Reserve Bank of New York found that during the period of December 1996 to March 31, 2000, the average trade size for 2-year notes

TABLE 14.1

Issuance schedule for U.S. Treasury notes

Notes	Auction Frequency	Issue/Settlement Day
2-year	Every month	End of month
3-year	February, May, August, November	15th of month
5-year	Every month	End of month
10-year	February, May, August, November	15th of month
(Reopening)	(March, June, September, December)	

Source: U.S. Treasury Department

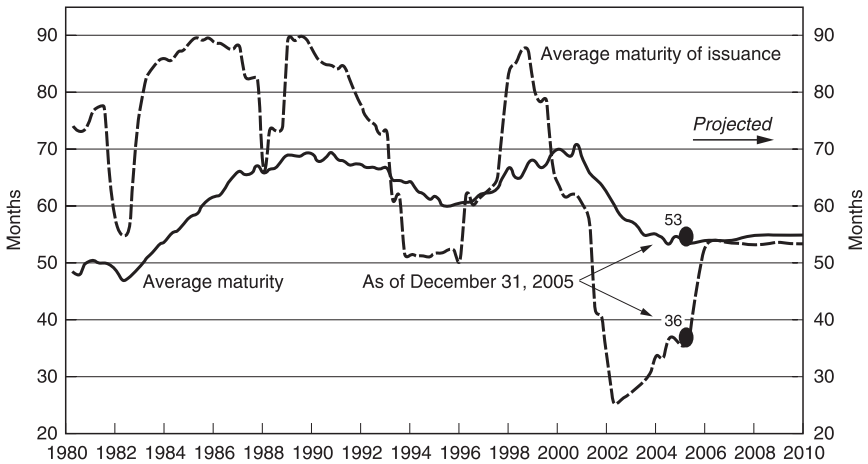
was \$14.2 million, and for 3-month bills it was \$22.5 million, the most of any of the Treasury maturities. The smallest trade size was for the 10-year note, which saw average volume of \$6.2 million. Based on these figures, the note market is clearly a wholesale market, except for sales to individuals and small portfolio managers who typically buy to hold to maturity.

The issuance of 2-year notes has been the most regular over the years, with 3-year notes discontinued for a time, between 1998 and 2003, and 5-year notes issued monthly in the late 1990s, changed to quarterly in 1999, and changed back to monthly issuance in June 2003. Also, the Treasury has varied its issuance of 10-year notes, moving from quarterly issuance in 2002 to eight auctions per year beginning in 2004 (10-year notes are issued quarterly, in February, May, August, and November, and these issues are reopened in the month following the auctions).

Bonds

Congress long ago imposed a 4.25% lid on the coupon that the Treasury could pay on new bond issues. Consequently, for years the Treasury could issue long bonds only to the extent that Congress exempted an increasing dollar amount of its bonds from this restriction. Congress was always loath to take such action; and, for this reason, the Treasury was able, in a number of years, to offer only two, not four, new long bonds. In the fall of 1988, Congress finally abolished its anachronistic lid on the coupon that the Treasury could put on new long bonds.

The increased issuance of long bonds during the 1980s contributed to a lengthening of the average maturity of the Treasury debt, which rose

FIGURE 14.3**Average maturity of U.S. Treasuries outstanding**

Note: Projections are based on current OMB MSR budget estimates, except for Treasury's internal FY 2005 estimate. Future residual financing needs are spread proportionally across auctioned securities to maintain constant maturity of issuance.

Source: U.S. Treasury Department

from a low of about 47 months in 1982 to as high as 71 months in 2000 (Figure 14.3). The average stood at 53 months at the end of 2005, which was the lowest level since 1984. The decline that occurred between 2000 and 2005 is notable, as it was due in large part to the Treasury's decision in 2001 to suspend its issuance of long bonds, with its last sale in August of that year. The suspension was related in part to the bright fiscal picture at that time, with the United States running yearly budget surpluses from 1998 to 2001. A return to deficits in 2002 almost certainly played a role in the Treasury's decision to resume issuance of long bonds beginning in February 2006. Another major factor was the global movement toward pension reform, which boosted demand for longer maturities for use as a match against future pension liabilities. Scant global supply of long bond issue also played a role, with many "natural" investors such as insurance companies left clamoring for the paper.

Treasury bonds used to be callable during the last five years of their life. The last such issue that the Treasury sold was the 11 $\frac{3}{4}$ s of 2014, callable in 2009. Starting in 1985, the Treasury eliminated the call feature from its bonds to facilitate the stripping of these securities into zeros (see STRIPS below).

INFLATION-INDEXED SECURITIES

In January 1997, the Treasury began issuing bonds that provided investors with protection against inflation. These bonds are commonly known as *TIPS*, or *Treasury inflation-protected securities*. They are also known as *inflation-indexed*, or *inflation-linked*, *bonds*. TIPS provide protection against inflation by indexing interest and principal payments to the inflation rate. Thus, the cash flows on TIPS securities increase along with the inflation rate. With TIPS, an investor is protected against inflation risk, one of the biggest risks facing bond investors.

As is illustrated later in the chapter, TIPS are indexed to the Consumer Price Index for All Urban Consumers (CPI-U), a monthly index released by the Bureau of Labor Statistics with its widely followed CPI statistics.

State and Local Government Series (SLGS)

The Treasury sells a relatively large number of Treasury securities directly to state and local governments. Commonly known as SLUGS, or more correctly SLGS, State and Local Government Series are nonmarketable Treasury securities that were created through the SLGS program in 1972 following legislation that restricted state and local government entities from earning arbitrage profits from investing bond proceeds subject to IRS arbitrage restrictions. SLGS are purchased by issuers with proceeds subject to yield restrictions and arbitrage rebate requirements under section 103 of the Internal Revenue Code. *Time deposit SLGS* are issued for terms fixed by the investor, with maturities from 15 days to 1 year; for notes, from 1 year to 10 years; and bonds, from more than 10 years to 40 years. *Demand deposit SLGS* are one-day certificates of indebtedness that are automatically rolled over with interest each day until redemption is requested. SLGS buyers may choose any interest rate so long as the rate doesn't exceed the maximum interest rate published daily by the Treasury's Bureau of the Public Debt. There was a record \$67 billion of SLGS issued in 2005, and the total amount outstanding stood at \$234 billion in February 2006.

Flower Bonds

The Treasury no longer sells flower bonds, which were *low-coupon* government bonds selling at prices well *below par* with a special feature: they were acceptable at par in payment of federal estate taxes when owned by

the decedent at the time of death. In 1977, the capital gain realized at the time of the holder's death was made taxable. The last of these bonds matured in November 1998.

Settlement

Trades in Treasuries can be done either for *cash* (same-day) settlement or for *regular* (next-day) settlement. The norm is regular settlement, and the vast majority (close to 100%) of note and bond trades is done for regular settlement. Cash settlement, which must be agreed upon by both the buyer and the seller, is more common in bills. Trades in Treasuries can also be done for skip-day settlement or later—maybe because the buyer is doing something against a corporate issue that settles on a corporate basis. In 2004, the Federal Reserve Bank of New York began releasing statistics on trades of U.S. Treasuries and other securities that failed to settle on the date agreed upon by a buyer and a seller (referred to as *fails*). The Fed found that from 1990 to 2003, fails varied greatly, from as low as \$3.8 billion per day to as much as \$232 billion per day in the summer of 2003. Fails occurred in every week between July 1990 and December 2004, averaging \$12 billion per day.

Attraction to Investors

Treasury securities offer the investor several attractive features. They expose her to zero credit risk, they are excellent instruments for hedging other securities and against interest rate risks, and, while they yield less than other market instruments except for municipals, they are the most liquid instruments traded in the money market. In addition to the factors cited earlier, Treasuries owe their liquidity to the fact that most individual issues are extremely large, and governments are thus not discrete heterogeneous instruments, like bankers' acceptances or medium-term notes. In the fall of 2006, for example, individual bill issues outstanding generally ranged from \$15 billion to \$20 billion.

Another advantage of Treasuries is that interest income earned on them is *not* subject to state and local taxation. Also, interest earned by holding a T-bill to maturity can be treated for tax purposes as having all been earned in the year the bill matures. A final attraction of governments is the wide array of these securities available. At the end of February 2006, the Treasury had \$1 trillion of bills outstanding consisting of 43 different

bill issues ranging in current maturity from a few days to six months. The Treasury also had 103 note issues valued at \$2.391 billion, 46 bond issues valued at \$526 billion, and 19 inflation-indexed issues valued at \$345 billion. The current maturities of these note and bond issues range from a few days to 30 years, although there was only one issue maturing between 2031 and 2036 owing to the Treasuries suspension of the issuance of 30-year bonds in August 2001. Also, as noted below, investors can buy a wide array of STRIPS.

Table 14.2 shows how ownership of the government debt is split between different classes of investors. The top part of the table, which refers

TABLE 14.2

Summary of Treasury securities outstanding, February 28, 2006 (in millions of dollars)

Title	Amount Outstanding (\$)		Totals
	Debt Held by the Public	Intragovernmental Holdings	
Marketable:			
Bills	997,284	2,277	999,561
Notes	2,390,260	1,482	2,391,742
Bonds	526,498	218	526,716
Treasury inflation-protected securities	345,431	120	345,551
Federal financing bank	0	14,000	14,000
Total marketable	4,259,473	18,098	4,277,570
Nonmarketable:			
Domestic series	29,995	0	29,995
Foreign series	3,586	0	3,586
R.E.A. series	1	0	1
State and local government series	234,545	0	234,545
U.S. savings securities	205,901	0	205,901
Government account series	32,414	3,480,671	3,513,085
Other	5,203	0	5,203
Total nonmarketable	511,644	3,480,671	3,992,315

Source: U.S. Treasury Department

to *marketable* Treasury debt, is of most interest for present purposes. It shows that the foreign investors are the biggest holders of Treasuries, followed by the Federal Reserve. The next largest holders are state and local governments, followed by the household sector. What is interesting about the breakdown is that the largest holders collectively have a tendency to buy and hold their Treasury securities. This is one of the reasons why Treasury yields have been low in recent years—with so many natural buyers, there haven't been too many willing sellers.

BOOK-ENTRY SECURITIES

In 1976, the Treasury announced that it would move over time to a system under which virtually the entire marketable federal debt would be represented by *book-entry securities* instead of engraved pieces of paper. The Treasury met its objective in 1986 when the last registered security was issued. Under the book-entry system, banks that are members of the Federal Reserve hold securities at the Fed in accounts on which record keeping is computerized. All marketable governments may be held in book-entry form, and the bulk of the Treasury's marketable debt is now held in this form. Today there are only residual quantities of three dozen issues due to mature before the end of 2016 in either bearer or registered form, the two forms of physical securities.

According to the Federal Reserve, the most significant factor in the early development of the Federal Reserve book-entry system was the familiarity that Reserve banks had with safekeeping securities. This developed over the many years that the banks held securities pledged by member banks as collateral on discount-window loans and against deposits of public funds, such as Treasury tax and loan balances. The Fed's safekeeping of securities gave the Reserve banks experience in running vault facilities, hiring and retraining a trustworthy labor force, and clipping coupons, all of which gave the Fed experience in recognizing the costs associated with providing custodial services. Despite these advantages, in 1963 the Federal Reserve Bank of San Francisco reported publicly the disappearance of \$7.5 million of bearer securities. This led to an investigation by a subcommittee of the Conference of Presidents that concluded a book-entry system was both "practical and desirable." This basically was the beginning of the end of physical Treasuries. By 1970, roughly half of the \$248 billion of marketable Treasuries were in book-entry form. The movement to book-entry securities and wire transfers was precipitated further in

1970 by the refusal of several major insurance underwriters to underwrite government securities held by dealers. Treasury notes and bonds (but not bills) could be registered, but in fact dealers and most major investors held them as well as bills, in bearer form. So there was a huge volume of valuable bearer paper being stored and constantly moved about on the Street, thus inviting theft.

Faced with an insurance crisis, the dealers began to hold their securities in accounts at the major banks. At the same time, the Fed initiated a system that made it possible for banks to wire securities between each other during each business day. At the end of the day, however, the banks had to show up at the Fed and take physical delivery of any issues on which they had been *net* receivers over the day and to make physical delivery of issues of which they had made *net* deliveries over the day. This procedure eliminated much messenger traffic in governments, but hundreds of millions worth of the securities still had to be carried between the banks and the New York Fed at the end of the day to effect net settlements. The introduction of book-entry securities would eventually eliminate these end-of-day movements.

All these events led to the movement toward book-entry securities; by September 1982, the Treasury had stopped issuing bearer bonds, and by December 1982 it no longer issued bearer notes. In August 1986, the Treasury introduced its TreasuryDirect system, which was designed to accommodate retail investors. The Treasury subsequently announced that it would no longer issue notes or bonds in registered form.

A bank typically has several different book-entry accounts at the Fed. For example, it may have one account for securities in which it has an interest: securities in its dealer position; securities in its investment portfolio, and securities it has taken in on repo; a second account for securities it is safekeeping for corporate and other investors; and a third account for securities it holds for dealers for whom it clears.

The Fed tracks the amounts and types of securities every bank has in each of its accounts, and, as of 2000, the Fed maintained approximately 25,000 safekeeping accounts, and in 2000 approximately 29 trillion transactions valued at \$192 trillion were initiated using the Fed's book-entry system. A large proportion of these transactions were conducted by a small percentage of the safekeeping accounts. In fact, about half the volume seen in 2000 was between two large money center banks.

Each bank tracks for the investors and dealers for whom it holds securities what issues and amounts of these issues each such institution

has placed with it. In New York, the major banks are linked by wire to the Fed, and all securities transfers among them are made by *wire*. If Bankers Trust were, for example, to sell bills to Citibank, it would make delivery by sending a wire message to the Fed, which would then debit Bankers Trust's account for *X* bills and credit Citibank's account for the same number. Simultaneously, the Fed's computer would automatically transfer money equal to the purchase price of the bills out of Citibank's reserve account at the Fed into Bankers Trust's reserve account. Now that literally trillions of dollars of governments are stored in the Fed's computers, the Fed faces a classic records protection problem. It undoubtedly has considerable backup to make its system fail-safe.

The book-entry system for governments was designed by the Treasury in haste and under pressure, but it has worked efficiently and has been accepted with enthusiasm by dealers, banks, and investors. To move to book entry, the Treasury set up an enabling regulation that had the effect of law and, to the extent that it conflicted with portions of the uniform commercial code in regard to transfers and pledges, had the effect of overriding that law. Ever since the Treasury moved to a book-entry system, all federal agencies that still issue securities to the public have come up with their own versions of the Treasury's regulation.

PRIMARY DEALERS

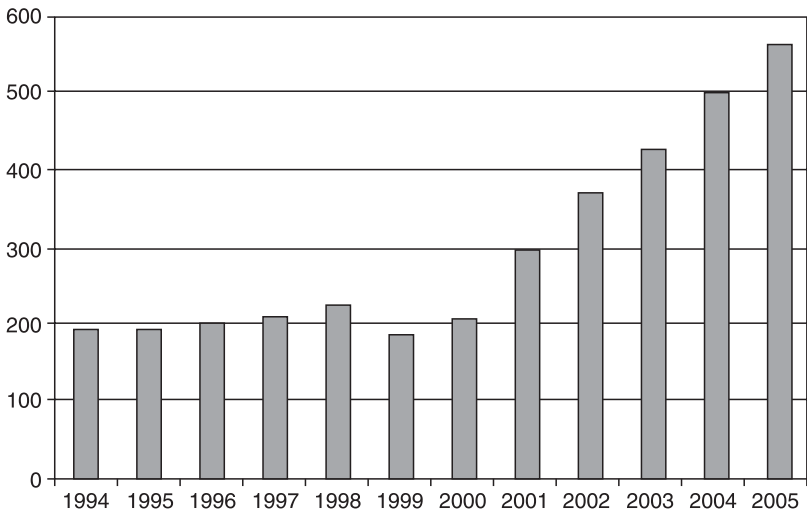
Any firm can commence dealing in governments and federal agency securities. The Fed, however, will deal directly only with recognized or primary dealers.

Primary dealers are banks and securities broker-dealers that trade in U.S. government securities with the Federal Reserve System. Primary dealers play a crucial role in supplying liquidity in the U.S. Treasury market, trading approximately \$500 billion of U.S. Treasuries, \$80 billion of government agencies, and \$193 billion of mortgage-backed securities on average during one week in February 2006. In 2005, the average daily Treasury volume was \$575 billion (see Figure 14.4).

Primary dealers play an important role in the implementation of the Fed's monetary policy. They do this by buying and selling securities from the Fed in the open market. The purchase and sale of securities in the open market adds or removes money from the banking system, and this pushes interest rates to the Fed's desired levels. This process is discussed in greater detail in Chapter 9.

FIGURE 14.4

Historical average daily trading volume for U.S. Treasuries
(in billions of dollars)



Note: The figure displays average daily volume of U.S. Treasury securities primary dealer transactions by year.

Source: Federal Reserve Bank of New York primary dealer data.

The Federal Reserve Bank of New York established the primary dealer system in 1960. Many elite banks and broker dealers have held the respected primary dealer designation since then, starting with 18 primary dealers in 1960 and peaking at 46 in 1988. The number of primary dealers has fallen over the years, owing mostly to consolidation in the industry, as government securities dealers have either merged or changed the focus of their business. Currently, there are 22 primary dealers consisting of many household names. The 22 primary dealers are shown below:

Primary Dealer List as of October 2006

Bank of America Securities LLC
Barclays Capital Inc.
Bear, Stearns & Co., Inc.
BNP Paribas Securities Corp.
CIBC World Markets Corp.
Cantor Fitzgerald & Co.

Citigroup Global Markets Inc.
Countrywide Securities Corporation
Credit Suisse Securities (USA) LLC
Daiwa Securities America Inc.
Deutsche Bank Securities Inc.
Dresdner Kleinwort Wasserstein Securities LLC
Goldman, Sachs & Co.
Greenwich Capital Markets, Inc.
HSBC Securities (USA) Inc.
J.P. Morgan Securities Inc.
Lehman Brothers Inc.
Merrill Lynch Government Securities Inc.
Mizuho Securities USA Inc.
Morgan Stanley & Co. Incorporated
Nomura Securities International, Inc.
UBS Securities LLC

Becoming a primary dealer is not easy. Recognizing the critical role that primary dealers play in the implementation of monetary policy, the Federal Reserve has established very stringent requirements for obtaining the primary dealer designation. For starters, primary dealers must be either a commercial bank subject to supervision by U.S. federal bank supervisors or broker-dealers registered with the Securities and Exchange Commission. There are no restrictions on foreign-owned banks or broker dealers becoming primary dealers.

There are also very stringent capital requirements for becoming a primary dealer. According to the New York Fed's current criteria, bank-related primary dealers must be in compliance with Tier 1 and Tier 2 capital standards under the Basel Capital Accord, with at least \$100 million of Tier 1 capital. Registered broker-dealers must have at least \$50 million in Tier 2 capital and total capital in excess of the regulatory "warning levels" for capital set by the Securities and Exchange Commission and the Treasury, the two regulatory bodies that oversee nonbank securities trading organizations.

Tier 1 and Tier 2 capital are simply fancy names for the types of capital needed for firms to obtain the primary dealer designation. Tier 1 capital includes common stockholders' equity, qualifying noncumulative perpetual

preferred stock, and minority interest in the equity accounts of consolidated subsidiaries. Tier 1 capital is normally defined as the sum of core capital elements, less goodwill and other intangible assets. The Tier 2 component of a bank's qualifying total capital may consist of supplementary capital elements such as allowance for loan and lease losses, perpetual preferred stock and related surplus, hybrid capital instruments and mandatory convertible debt securities, and term subordinated debt and intermediate term preferred stock.

These stringent capital requirements are designed to help ensure that primary dealers are able to enter into transactions with the Fed in sufficient size to maintain the efficiency of their trading desk operations.

In essence when the Fed recognizes a dealer, it looks for capital, character in management, and capacity in terms of trained personnel. Specifically before the Fed will do business with a firm, it wants to ensure: (1) that the firm has adequate capital relative to the positions it assumes; (2) that the firm is doing a reasonable volume (at least 1% of market activity) and that it is willing to make markets at all times; and (3) that management in the firm understands the government market—particularly the risks involved—and is making a long-term commitment to the market.

When a firm expresses an interest to the Fed in becoming a primary dealer, the Fed first asks it to report its trading volume and positions on an informal basis. If the firm appears to meet the Fed's criteria, the Fed then puts it on its regular reporting list. After a time as a *reporting dealer*, if the firm still appears to meet the Fed's criteria, the Fed recognizes that dealer and does business with it.

Primary dealers assist the Fed not only by facilitating the implementation of its directives on monetary policy but by giving it valuable information. For one thing, the Fed requires primary dealers to make reasonably good markets by providing fair quotes in their trading relationships with the Fed's trading desk. In addition, primary dealers must participate meaningfully in auctions of U.S. Treasuries held by the U.S. Treasury. Interestingly, primary dealers must also offer market information and analysis to the Fed's trading desk, which the Fed uses in the formulation and implementation of monetary policy. The primary dealers must also report weekly on their trading activities, cash, futures, and financing market positions in Treasury and other securities. Primary dealers tend to carry larger amounts of inventories of fixed-income securities and a greater variety of these securities. The dealers also tend to have a greater ability than smaller market participants to participate in offerings of new fixed-income securities.

The big profits primary dealers make in good years and the decline in brokerage income on stock trades were two reasons many firms set up dealerships in governments. Another was that firms specializing in corporate bonds felt it was important to get into the government market to obtain firsthand knowledge of this market, which they could use as a tool in marketing new corporate bonds: sell corporates, for example, by swapping customers out of governments.

Setting up a dealership in governments is time consuming, difficult, and costly. Talented personnel, usually in scarce supply on the Street, must be hired and then welded into a team that works. Firms entering the government market normally expect to lose millions before they create an organization capable of producing profits. As noted above, primary dealers have a very big presence in the bond market both in terms of their daily trading volumes and their relationship with the Fed. Primary dealers therefore play a critical role in the functioning of the bond market, providing the substantial amounts of liquidity necessary to keep the bond market running smoothly and efficiently and helping to keep funding costs down for the U.S. government.

AUCTION PROCEDURES

Currently, the Treasury sells all of its marketable debt through auctions. The Treasury auction process begins with the Treasury Department's announcement of a forthcoming auction. In its announcement, the Treasury details exactly when the auction will take place and the amount of securities that it plans to sell. For bills, announcements are delivered at 11 a.m. (ET), as are the announcements for the monthly 2- and 5-year note auctions, reopenings of 10-year notes, and inflation-indexed securities. Announcements for the auction of 3-, 10-, and 30-year maturities are delivered at 9 a.m. (ET) on announcement day.

Immediately following the Treasury's announcement, Treasuries begin trading on a "when, as, and if issued" (WI) basis. Prior to auctions, WI securities are quoted and traded on a yield basis, and no coupon rate is provided because it is not determined until after an auction is completed. All when-issued transactions settle on the issue date of the to-be-auctioned security, which for 3- and 6-month bills is one week after auctions for these securities are announced. The when-issued period provides important information about market sentiment toward a particular security by serving as a price discovery mechanism. When-issued trading helps to make

auctions more competitive by enhancing the transparency of the market. Another major aspect of WI trading involves its distributional effects or its impact on getting the newly auctioned securities distributed to buyers. In particular, the WI trading period lengthens the time in which the marketplace can absorb the new issues. In addition, during the WI period, Wall Street's primary dealers make sales to investors that require an eventual offset (unless the dealers want to stay short) or purchase, creating an important financial incentive for dealers to accurately assess the equilibrium in the market, thus further enhancing the efficiency of the market.

Auction participants can submit either a competitive or noncompetitive bid that specifies the minimum yield that the participant will pay. For bills, the participant would specify the minimum discount rate that she would pay. Noncompetitive bidders receive the price paid by competitive bidders, which is determined at auction. Noncompetitive bids are limited to \$5 million and are usually due before noon (ET) on auction day; competitive bidding usually closes at 1 p.m.

Treasury auctions are conducted in a single-price format, which was first introduced in 1992 following several violations of auction rules in 1991. Single-price auctions are sometimes known as *Dutch auctions*. Empirical analysis of the auction format was compelling enough for the Treasury in 1998 to switch all its auctions to the single-price format. The multiple-price format had been in place since 1929, and it stayed in place until the 1970s when the Treasury introduced auctions of coupon-bearing securities. For decades, numerous academics had suggested that a move to a single-price format might save the Treasury money. One of these academics is the highly regarded Milton Friedman, who had suggested the single-price format as far back as 1960!¹ In a single-price format, those that bid for securities can do so without worrying that they might receive a price that is higher than the prices paid by others in the auction process. The format thus removes the so-called winners curse associated with multiple-price formats. In the single-price format it is felt that bidders are likely to be more inclined to submit bids at lower yields than they would in the multiple-price format because they could still benefit fully from auctions that result in higher yields. For example, if a bidder submits a bid to buy 2-year notes at 4.26% but the auction price is 4.28%, the bidder would be awarded securities at 4.28%. The single-price format is the

¹ Milton Friedman, *A Program for Monetary Stability* (New York: Fordham University Press, 1960).

opposite of the multiple-price format in which bidders will tend to bid higher yields in hopes of gaining a more favorable yield.

Beginning in 1995, the Treasury allowed bids to be submitted in increments of $\frac{1}{10}$ of 1 basis point. Previously, bidding occurred in whole basis point increments. The change took place to “increase participation in Treasury auctions and to conform the auctions to market practice for when-issued trading.”² In 1997, the Treasury altered the bidding increment to $\frac{1}{2}$ of 1 basis point for all bills, hoping to promote greater efficiency and more aggressive bidding.

The Treasury limits bidding to 35% of offerings, less the bidder’s “reportable net long position” in the security. A bidder’s net long position is the sum, as of a half hour before the close of bidding, of

1. When-issued, forward, and futures contracts for the security and for principal STRIPS to be derived from the security.
2. The excess, if any, of (a) its net holdings of previously issued securities with the same identifying CUSIP number and principal STRIPS derived from such securities over (b) an exclusion amount equal to 35% of the aggregate amount of previously issued securities with the same CUSIP number.

A bidder must report its net long position along with its auction bids if the sum of its net long position and its bids exceeds 35% of the offering.

Bidding Systems

Until 1993, bids were submitted in paper form either in person or by mail at the Treasury Department in Washington, D.C. or at a Federal Reserve bank or branch. It was a challenging bidding process, given the risk that there could be price volatility in the moments leading up to the close of bidding for an auction. Recognizing this, the primary dealer community would station employees in the lobby of the Federal Reserve Bank of New York where primary bidders would relay bidding instructions immediately before the close of bidding. Other participants would submit their bids through the primary dealers, who were responsible for submitting their bids. All the bids were processed manually, and it would take time for the Treasury to reveal the results of the auctions. Results would arrive as fast

² “Treasury Modifies Competitive Bidding Requirement for Notes and Bonds,” *Treasury Bulletin*, June 1995, p. 33.

as a half-hour later; in other cases as long as two hours later. Great uncertainty existed in the Treasury market during the waiting period, probably hurting the market's efficiency (at the very least, it caused a lot of nail biting). Bidders would often bid less aggressively under the old paper system, reflecting the uncertainty that they would be subject to while they awaited the auction results.

Under the current system, which has been in place since 1993, bids are submitted electronically and auction results are released usually within two minutes of the close of bidding, which is usually at 1 p.m. The Treasury had set a goal in 2002 to consistently release auction results within two minutes, and its objective was achieved in the middle of 2003.

The Treasury utilizes a computer application called *TAAPS* (Treasury Automated Auction Processing System), which is a system that aggregates both the competitive and noncompetitive bids submitted to the Treasury. The system first aggregates the noncompetitive bids to determine the amount that must be sold to competitive bidders. Then it ranks the competitive bids in order of increasing yield or discount rate, identifies the stop (the final yield that the Treasury must go up to before selling the entire amount of securities it said it would sell in the auction), and then identifies the allocation at the stop, which is the amount of awards that will be given expressed as a percentage of the bids submitted at the stop. *TAAPS* prepares a notice of award for each successful bid, identifying how many securities were awarded and their prices. Auction participants submit their bids through the Treasury's *TAAPSLink* system. All but the primary dealers submit their bids through an Internet version called *TAAPSLink v1*, although retail investors do not do so directly, submitting their bids via mail, telephone, and Internet applications. Primary dealers use a *TAAPS* version called *TAAPSLink v2*. More than 800 investors were using the *TAAPSLink* system in 2003.

The introduction of electronic bidding was a prerequisite to electronic processing, and it facilitated the direct bidding by market participants other than primary dealers even up until the close of competitive bidding.

Utilizing the above systems, auction participants can bid either directly with the Treasury or indirectly via primary dealers. Very few bids are submitted directly, in part because institutional investors utilize primary dealers on an ongoing basis to obtain research and other information of value to them and feel a need to do business with the primary dealers in return. Only 2.2% of all awarded bids were submitted directly in 2003,

according to the Bond Market Association. Dealers represent the largest share of the auction awards, having submitted 86% of all bids in 2003, followed by *indirect bidders*, which are bids submitted through a primary dealer. Indirect bidders include foreign central banks and official accounts as well as any customer that submits a bid through a primary dealer. In 2003, indirect bidders submitted \$800 billion in bids and were awarded \$610 billion, representing 19% of all auction awards. Primary dealers were awarded 78% of auction awards in 2003, reflecting the fact that they submit a large number of bids on behalf of customers.

Successful bidders take delivery of their Treasury securities directly from the Treasury, although about 75% of all auction deliveries are made to dealers indirectly through the *Fixed Income Clearing Corporation* (FICC), which is a clearing agency registered with the Securities and Exchange Commission that acts as the central clearing corporation for Treasury securities. In 2003, 89% of all 4-week bills and 67% of all 10-year notes were delivered through the FICC. Securities are credited to a successful bidder's depository account at 9:15 a.m. on the issue date, unless of course the bidder is a depository institution, which will be credited directly (the Fed, acting as fiscal agent for the Treasury, then debits the institution's reserve account for the cost of the securities and transfers this sum to the Treasury). Retail investors bidding through their TreasuryDirect accounts take delivery directly from the Treasury, generally paying by check, with the proceeds from a maturing security in the same account, or via a debit to accounts they hold at depository institutions.

Supply Matters—Not

It is often said that large U.S. budget deficits and the large Treasury auctions that stem from the deficits boost interest rates. This is a relatively basic concept, but recent history doesn't provide a lot of support for this view given the steady decline in U.S. interest rates that has occurred over the past 25 years despite budget deficits in most of those years except the period of 1998–2001. It is important to note that even after the United States went from a surplus of \$237 billion in 2000 to a record deficit of \$412 billion in 2004, interest rates moved lower during the period. In a similar situation in Japan, despite running the largest budget deficit of any industrialized country in the world, its interest rates were the lowest. Deficits seem to worry investors more when they pertain to countries whose long-term economic and financial record has been relatively weak

compared to the norm. For example, in the 1980s and 1990s there were a number of Latin American countries whose interest rates would skyrocket on any hint of deterioration on the fiscal front. It seems that investors put a great deal of emphasis on the long-term credit standing and economic prospects for individual countries. For the United States, its storied economic history enables it to borrow at attractive rates even when faced with short-term erosion in its fiscal situation. It can also be argued that interest-rate levels are far more dependent upon variables such as the inflation rate, which is the bane of the bond market. As evidence, Japan is again a good example. The ultralow interest rates Japan experienced in the 1990s and early 2000s coincided with a protracted period of deflation, which made the 1.5% return often seen on its 10-year note appear attractive relative to inflation, or lack thereof in this case.

One other point about supply: it tends to matter more in bear markets than in bull markets. When interest rates are trending higher, new supply tends to exacerbate the move, largely because the Street must bid for the supply and worry about distributing it. When rates are falling, new supply is of little burden to the bond market and is easily absorbed.

Secondary Market

Little trading in outstanding notes and bonds occurs on organized stock exchanges. The New York Stock Exchange lists a few issues, and the American Exchange (AMEX) offers odd-lot trading in a few others, but neither exchange moves much volume. For example, on one day in March 2006, only \$4 million worth of bonds traded on the New York Stock Exchange. The real secondary market for bills, notes, and bonds is the dealer-made market, in which far more massive quantities of bills, notes, and bonds are constantly traded under highly competitive conditions at small margins. Before we turn to that market, let's look at the brokers.

THE BROKERS

Dealers in government securities actively trade with retail (institutional investors) and with each other. A large portion of these transactions is done through *interdealer brokers* (*IDB*), which bring buyers and sellers together in a centralized location, nearly all of which is now electronic. Data from the New York Fed show that on an active day in March 2006, primary dealers traded \$646 billion of Treasuries, \$278 billion of which

TABLE 14.3

Primary dealer transactions in U.S. government securities for week ended March 22, 2006 (daily average figures in millions of dollars)

U.S. Government Securities	Outright Transactions
Treasury bills	49.016
Coupon securities	
Due in 3 years or less	202.242
Due in more than 3 years but less than or equal to 6 years	123.783
Due in more than 6 years but less than or equal to 11 years	116.295
Due in more than 11 years	29.80
Treasury inflation-indexed securities (TIPS)	6.288
Total U.S. government securities	526.784

Source: Federal Reserve Bank of New York

were traded through interdealer brokers, the rest of which were traded elsewhere, mostly with retail.

Table 14.3 shows a breakdown of the U.S. Treasury securities traded among the primary dealers. As the table shows, most of the volume occurs in shorter maturities, usually in securities due in three years or less.

The most important reason brokers are used in the government market is ease of communication. Brokers enable dealers to both display the bids and offers that they wish to make on securities and observe the bids and offers that other dealers are making, thus enabling both parties to match their buy and sell orders.

These days, most government securities transactions that are done through brokers take place via *electronic communication networks*, or ECNs. The Securities and Exchange Commission (2000) defines ECNs as “Electronic trading systems that automatically match buy and sell orders at specified prices.” ECNs have many advantages over voice and other systems. For one, they can be used by investors throughout the world, without regard to location. Second, they create greater transparency by joining a greater number of parties than could be possible through other means. Third, ECNs augment the processing and clearing of trades electronically. Finally, they make available additional information for investors and policy makers to analyze for a variety of different purposes.

During the third quarter of 2005, ECNs saw trading of \$21.19 trillion in on-the-run (the actively traded benchmark maturities) Treasuries.

Two firms dominate the interdealer broker (IDB) market for secondary market transactions in government securities: ICAP PLC, which had a market share of 60% in 2005, and Cantor Fitzgerald, which had a 28% share. The remainder of the interdealer market is rounded out with Tullett Prebon,³ at 9%, and Hilliard Farber & Co., at 3%. The *secondary market* refers to transactions that take place after the U.S. Treasury has auctioned its debt to the public in the *primary market*. Secondary volume represents 70% of all trading volume.⁴ ICAP's ECN trading volume takes place largely through its BrokerTec platform; eSpeed is Cantor's main ECN platform. Cantor's was the first ECN in the bond market, entering the market in 1999. A year later, several Wall Street firms, including Goldman Sachs and Morgan Stanley, formed BrokerTec to compete with eSpeed. BrokerTec was later bought by ICAP PLC, a global London-based IDB in 2003. In the past, the ECNs were often used to initiate voice transactions, which are now far less commonplace. Cantor was the dominant player in those days—its dominance rising sharply after it took a controlling interest in Telerate, a network that disseminated pricing information, news, and analysis mostly for the fixed-income and foreign exchange markets. ICAP leapt past Cantor, whose market share in on-the-run trading was once as high as 70%, through a series of acquisitions and alliances including its partnership with MarketAxess in March 2004, and its purchase of GovPX in January 2005. ICAP also lowered transaction costs to its users, grabbing additional market share. In 2003, Cantor alleged a patent infringement upon ICAP, but the case was dismissed in February 2005 by a Delaware court.

³ According to Mizrach and Neely of the Federal Reserve (2006), Collins Stewart Tullett PLC is an agglomeration of a number of prior firms: (1) Collins Stewart Ltd. was a London-based financial services firm founded in 1991; (2) Tullett & Riley was founded in 1971 and originally focused on foreign exchange; (3) Tokyo Forex took a stake in Tullett in 1986 creating Tullett & Tokyo; (4) in 2000, Tullett & Tokyo merged with Liberty Brokerage to create Tullett & Tokyo Liberty; (5) Prebon was formed in 1990 following the merger of three leading London-based money brokering businesses, Babcock & Brown, Kirkland-Whittaker, and Fulton Prebon; (6) Prebon's close business alliance with the Tokyo-based Yamane Tanshi provided its current title of Prebon Yamane. Collins Stewart acquired Tullett in March 2003, and Prebon in October 2004. The firm's IDB business uses the name Tullett Prebon.

⁴ Frank J. Fabozzi and Michael J. Fleming, "U.S. Treasury and Agency Securities," *The Handbook of Fixed Income Securities*, 7th ed. (New York: McGraw-Hill, 2005).

Evidence of the benefit that the ECNs provide to investors is apparent in the bid-ask spreads for Treasury securities. Mizrach and Neely (2006) found that the reduction in spreads for the ECN quotes compared to that of GovPX voice market spreads during the period 1999–2004 was both “statistically and economically significant.” For example, the quote spreads for 2-year notes averaged 0.8344 for GovPX quotes versus 0.2053 for the eSpeed ECN quotes, a reduction of 75%. For 5-year notes, the reduction was 0.8834 of a basis point, or 76%, and for 10-year notes the reduction was 1.7167 basis points, an 82% reduction. A combination of inventory and adverse selection costs explains the existence of spreads in the interdealer market. The inventory component is the cost of keeping a ready supply of securities for sale. The adverse selection component is caused by the risk that the dealer’s counterparty has private information about future price changes which could lead to losses for the dealer.

The Brokers’ Screens

In 1979, Garban became the first dealer to replace quotes over the phone with CRTs. Now, all the brokers use screens to disseminate quotes. A broker displays bids and offers placed with it for bills, Treasury coupons, and agencies on several different screens. When a new bid or offering comes in, the broker enters it into her IDB system and the new quote immediately appears on the screen in the dealers’ trading room. Generally, a broker considers a bid or offer placed with it good until canceled. However, a good broker will come back to her customer and check periodically. If a bid or offering is stale, she will say, “Can we freshen this up?”

Under what conditions bids and offers in the government market will *go off* or *subject* (to reconfirmation) is a matter left up to individual brokers. For example, when some key economic number is released, some brokers make the market subject, others don’t; in this area, there are no formal rules. The practice of having the brokers’ screens go subject whenever an important economic number comes out gives everyone a shot at reacting to such developments and thus protects traders from getting picked off.

Brokers’ screens contain a lot of information. Today, the prices at which Treasuries trade are sharply influenced not just by the fed funds rate and what the Fed is doing, but by oil prices, commodity prices, exchange rates, and the performance of other segments of the bond market as well as other asset classes and news of all kinds. Reflecting this, a bill trader

now finds on various brokers' screens quotes on a wide variety of securities, most of which are at the traders' selection, since most systems enable traders to customize their screens and to have many different screens available at any given time.

Screens have been around in the government market for over 25 years, and they are now an essential part of trading. The screens themselves sometimes affect the way that traders transact. As one broker said with regard to trading, "A lot of this market is psychology, and when those screens start blinking hit, hit, hit ('hit' is what is shown when a trader hits a bid) it has tremendous impact." Because of the speed with which big trades can be executed through brokers, by their very existence the brokers have contributed to the growth of new trades and trading techniques. Noted one bill trader, "It is now more efficient, for the cash-and-carry business against futures, to use the brokers when you want to buy size. Rather than call dealers to find out who has the bill I want, I can put a bid into the brokers' market and get execution almost immediately. In the old days, it would take me 10 or 15 minutes to buy \$100 million. These days, I can do that in a second or two. The pace of this business had gotten a lot more frenetic."

Commissions

The commission rates brokers charge on Treasuries have fallen sharply over the past 10 years. Fleming reports fees on the trade initiator of \$39 per \$1 million of bonds in the voice-brokered GovPX markets.⁵ By 2005, these fees had fallen by more than 90% to \$2.50 on eSpeed and \$2.00 on BrokerTec for the best customers.⁶ The commission rate brokers used to charge on coupons was $\frac{1}{128}$, which equals \$78.12 per \$1 million. Dealers thought this too much. Over the years prior to 1986, several developments occurred that increased brokers' profits. First, there were technological changes that lowered the cost of brokering. Second, brokers were able to accommodate the huge increases that occurred in the average size and number of brokered interdealer trades at limited additional cost. Despite these developments, no broker cut her rates; interbroker price competition was nil. The upshot was that brokers earned increasingly higher profits, profits that dealers came to regard as absurd. A dealer's definition of what

⁵ Michael J. Fleming, "The Round-the-Clock Market for U.S. Treasury Securities," Federal Reserve Bank of New York, *Economic Policy Review*, July 1997.

⁶ Daniel Kruger, "On the Run," *Forbes*, August 15, 2005.

constituted an absurd level of brokers' profits was simple; at the brokerage rate of \$78.12 per \$1 million on coupons, a big broker who assumed *no risk* was earning on an \$80 billion-volume day, more profit than was the average dealer who—to make any money—had to assume *lots of risk*.

To introduce some price competition to the world of government brokering, Salomon Brothers in 1986, together with a group of 30 other dealers, formed a new government bond broker, Liberty Brokerage, Inc. The advent of Liberty caused brokerage rates on government notes and bonds to fall immediately to $\frac{1}{256}$, one-half their old level. Nevertheless, Liberty never became much of a factor in the market. After three years in the business, it was doing only 2% to 3% of all brokered trades and was said to be losing money. The dealers never put the resources into Liberty to build it into a really professional operation. Perhaps all the dealers ever wanted was to put Liberty in place and keep it there to prevent the dealers from raising their commissions in the future. Perhaps also, the dealers, who know the dealing but not the brokering side of the business, thought that it would be far easier than it is to build from scratch a professional brokering operation.

Traders at shops that had an interest in Liberty had no interest themselves in favoring Liberty over other brokers. Any money that Liberty made went not into a trader's pocket but into her firm's general account. What a trader cares about most is her P&L, not the P&L of the firm, and, consequently, she judges brokers by one criterion—the quality of execution they provide.

Brokerage fees are paid only by the side that initiates a trade, so *locked markets*, markets in which the bid and offer are identical, can and do occur in governments. At times, when there is little interest in the market—no one wants to do anything—a locked market can persist, but not usually for too long.

Risks in Brokering

Brokers of governments deal only with primary and aspiring dealers who either have already been well vetted by the Fed or have a good reputation on the Street. This—plus the money market motto: “My word is my bond”—gives brokers and dealers a high degree of comfort with respect to the huge volume of trades executed through the brokers. Everyone expects everyone else to deal in good faith and to be able and in fact to settle trades on the agreed terms, even trades on which a trader has a big loss.

To a broker, the major risk in her business is that she may make a mistake. This might occur in several ways. First, a broker has to be careful about what rates she quotes on her screen, since she must stand up to them. Said one, “If we put a wrong number on the screen, most traders are good about it and tell us. But there are others who like to hang us. When their [direct phone line] buttons light, you almost know that there is something wrong on the screen.”

A second and bigger risk to a broker is that she and a client with whom she has done a trade may not both *know* that trade the same way: the security, the face amount, or the price. Because of tight controls, mistakes of this sort are infrequent, especially since brokers and traders often swap confirmation e-mails immediately after a trade is completed via instant messaging, e-mails, or information and analytical systems such as Bloomberg. Still, even one such mistake can wipe out a broker’s profits on a whole day’s trades. To avoid errors, brokers employ double- or triple-check, in-house systems to record accurately all trades they do; also, they check back with each client to make sure that both sides know every trade they have done the same way.

It used to be that errors would rarely occur when dealers talked with brokers or with other dealers on the phone because they knew how to go through the reconfirm on the phone so that no misunderstanding would occur. Describing this process, one dealer said, “If I call on the phone and say, ‘I have a par bid for \$10 million on the 2-year, are you interested?’ and the other guy says, ‘Yes, I will sell you \$10 million at the buck,’ then I say, ‘I buy \$10 million at par.’ We have said it a few times and, when we hang up, we both write the tickets right away.” Errors occur more often when salespeople talk to customers because many customers are unprofessional on the phone; so too are some junior salespeople.

Despite the care that brokers take, out trades do occur. Say a broker does a trade at 10 a.m., and when she later checks out with her counterparty, she says, “I sold you \$10 million 10-years,” and the counterparty says, “I did not buy \$10 million; I bought \$5 million.” Or maybe the broker and the trader both know the trade as \$10 million 10-years, but they don’t know the same price. Either way it’s an *out trade*. These out trades are one major reason why deliveries of securities fail on settlement day and why the fail rate is never zero. Fleming and Garbade found that fails to deliver Treasury securities occurred in every week between July 4, 1990, and December 29, 2004. Fails averaged \$12.0 billion per day during the period. Fails tend to be at their highest in the weeks before and during

the Treasury Department's quarterly refundings and in the weeks that include the end of a calendar quarter.⁷

In years past, when a dealer and a broker were faced with an out trade, they would try to reconstitute the trade, and, if they could not agree on what it was, the broker, more often than not, ate the cost of the out trade. When a broker ends up long or short because of an out trade, she always immediately covers that position, regardless of whether she has a gain or a loss in it.

Today, out trades remain fairly common, but compared to the amount of volume that is transacted on a daily basis, the tally is small. Still, the rapid growth of the fixed-income market has sometimes meant that dealers had many new hires lacking the experience, knowledge, and jargon of the business. Also, dealers came to view the brokers as just one more place, along with the Chicago pits, to trade—just another place to get business done. Dealers no longer have, toward brokers, a big brother attitude; consequently, many now tape their phone calls with brokers. Moreover, dealers usually keep electronic records of all communications with brokers and with everyone else for that matter. For example, firms keep records of all e-mail and instant message communications sent by employees. This imperative grew following a series of corporate scandals that followed the bursting of the financial bubble in the early 2000s.

Agent versus Principal

Brokers never give up names on trades done through them. They used to clear their trades through their respective clearing banks. Now, trades done through brokers are to be cleared via a netting process run by the *Government Securities Division* of the Fixed Income Clearing Corporation, which we discussed earlier. The Government Securities Division clears, nets, settles, and manages risk arising from a broad range of U.S. government securities transactions for its member firms, which include brokers, dealers, banks, and other financial institutions. Over the 12 months ended January 2006, the Government Securities Division compared a whopping \$678 trillion of government securities and settled \$214 trillion. The division compares trades using specific matching criteria including (but not limited to) the CUSIP number, the par amount, contra participant, transaction type, settlement date, repo rate, and final money.

⁷ Michael Fleming and Kenneth Garbade, "Explaining Settlement Fails," Federal Reserve Bank of New York, *Current Issues in Economics and Finance*, September 2005, 11(9).

By not giving up names on trades done through them, by acting as *blind brokers*, brokers in the government market assume in effect the role of principal. However, brokers in this area think of themselves as just rolling through a trade from one major dealer to another. Put in legal terms, brokers think of themselves as acting in fact as *agent, not principal*.

The brokers believe if there were a hit, failure to settle by one party to a brokered trade and consequent loss to the other party, the injured party would look through the broker to the other party who defaulted for restitution of his losses. Thus, the brokers' attitude is, "If there's a hit, don't [dealer] look at me, look at them [the defaulting dealer]." The Government Securities Act sort of defines government brokers as agents, but the issue hasn't been tested in court.

Although most people don't notice, British firms have a significant presence as principal brokers of U.S. government securities. Thus, to the U.S. brokers' longstanding conviction that they act as agents is added the mindset of their British parents; the Brits have been brokering for over 200 years, and when the Brits think brokering, they think agent, agent, agent.

While dealers have not contested, so long as things went smoothly, the notion that interdealer brokers are agents, one broker noted, "People will tell me that they do a lot of WI business with our firm because its parent has deep pockets. And that after we have hammered home that we are agents. Every time we add a new customer, we send out a letter stating the definition in the Securities Act of an interdealer broker as an agent, and so on."

The agent/principal question was brought to a head when dealers and brokers tried to agree on the Government Securities Clearing Corporation (the GSCC merged with the Mortgage-Backed Securities Clearing Corporation in 2003, with each becoming a division of the FICC), which was designed to make the clearing of governments more efficient. The dealers wanted the brokers to both put up capital and assume risk. The brokers said no on both counts but finally reached a compromise that probably made no one terribly happy.

By netting trades the clearing corporations eliminate the need for brokers to clear trades. To the brokers, cutting their costs sounds dandy, but they are less keen on the notion that an industry-owned cooperative is going to know exactly who is doing what business and that, in addition, the dealers might say, "Your costs were cut by X ; now cut your rates by Y ."

THE INTERNET AND OTHER FORMS OF ELECTRONIC TRADING

The most important way in which the Internet is affecting the bond market is through the rapid growth of electronic trading. The increased availability of electronic trading systems is giving investors additional ways in which to buy and sell bonds. The more these systems proliferate, the more efficient bond transactions are likely to get. For example, increased levels of competition are likely to encourage broker-dealers to be more competitive when providing quotes to the investing public. By creating a virtual marketplace, electronic trading is helping to reduce the need for investors to depend upon a small number of broker-dealers to fulfill their trading needs. This is enabling market forces to begin working their magic.

Another way in which electronic trading helps bond investors is by increasing the quote depth on bonds. As discussed in Chapter 2, quote depth basically refers to the size of the bids and offers on a particular security. The more quote depth a security has, the more likely it is that the bid-ask spread will be narrower. Moreover, quote depth affects the liquidity, or ease with which a buyer or seller can conduct transactions on a security at the fair market price.

The biggest areas of growth in electronic trading have been in the municipal, agency, and mortgage-backed securities markets. The electronic market for U.S. Treasuries is also active. For example, in the second quarter of 2006, TradeWeb LLC, one of the biggest online trading firms in the bond market, saw volume of over \$5.6 trillion in its rates division. That's roughly \$1 trillion above the dollar value of daily transactions at the New York Stock Exchange during the same period.

Types of Electronic Trading Platforms

There are five main types of electronic trading platforms:

- Cross-matching
- Single-dealer
- Auction
- Interdealer
- Multidealer

Let's take a brief look at each of these. Note that we refer to users of these systems as "customers."

Cross-Matching Systems

Cross-matching systems enable customers to enter anonymous buy and sell orders with multiple counterparties, thereby increasing the likelihood of executing their orders at desirable prices. Customer orders are filled when a match is found on the other side of the transaction or when a contra party decides to buy the bond at the customer's offer or hit the customer's bid. Cross-matching systems bring both dealers and institutional investors together in electronic trading networks that provide either real-time or periodic cross-matching sessions.

Single-Dealer Systems

As the name implies, single-dealer systems enable customers to deal directly with a single dealer, allowing them to execute trades through an electronic interface, particularly on the Internet. In this type of system, the dealers act as principals, meaning that they buy and sell securities for their own account. The full range of major fixed-income products are currently being offered through this system. This system enables investors to peruse a dealer's inventory of bonds, thereby helping customers locate bonds they may be interested in. The disadvantage here is the lack of competitive bids and offers. For example, who would want to buy stocks from just one firm rather than placing bids and offers out in the marketplace? Single-dealer systems tend to exist at the large, primary dealer firms such as Goldman Sachs and Merrill Lynch.

Auction Systems

Auction systems are basically online systems for auctioning new securities. The auction system functions just as you'd expect an auction system to, except that it takes place over the Internet. Users of this system simply post the security they want to sell and set the guidelines for the auction including the date of sale, type of auction (single price or multiple price), and so on. Bond issuers can use the auction system to reduce the cost of issuing securities. Ford Motor Company was one of the first companies to successfully use the auction system on the Internet.

Interdealer Systems

Interdealer systems enable dealers to trade with one another anonymously through an intermediary known as a "broker's broker." Interdealer systems

have actually existed for many years, with Cantor Fitzgerald at the forefront from the 1950s until ICAP became the dominant player. In the 1970s, Cantor introduced trading in Treasuries on electronic screens. As mentioned earlier, interdealer brokers such as Cantor have migrated to the Internet in recent years, enabling hundreds of the world's largest financial institutions to execute transactions in a simpler and more efficient way than in the past. This is evidenced by the speed of execution, greater quote depth, tighter bid-ask spreads, and lower transaction costs. The interdealer system is likely to remain a robust system for years to come, particularly because of the anonymity and liquidity the system provides to its users. Moreover, the Internet helps to facilitate new features such as customized trading screens, user alerts, and the ability to "check out," or review trading activity for the day.

Multidealer Systems

Multidealer systems have experienced sharp growth in recent years led by the explosive growth of TradeWeb, a New York-based online trading firm that enables institutional customers to buy and sell various types of fixed-income securities electronically with multiple primary dealers. In early 2006, over 2,200 of the largest buy-side institutions were using TradeWeb to both price their portfolios and execute trades. In 2005, total volume on TradeWeb was \$42.8 trillion (including corporates, mortgage-backed, and other fixed-income securities), and it was trading \$200 billion in securities per day at the end of 2005. TradeWeb's Treasury volume was \$9.98 trillion in 2005, and about 60% of that volume represented trades of \$50 million or higher.

One key advantage of the multidealer system is its ability to obtain prices from multiple dealers. This gives users a better chance of getting a better price on their executions. It's more efficient than the traditional phone method because users can obtain multiple quotes more quickly. The multidealer system differs from the interdealer system in that it facilitates trading between institutional investment management firms and broker-dealers, whereas the interdealer system facilitates trading between broker-dealers.

One of the more glaring aspects of these trading platforms is that they largely cater to the institutional investor. So, what about the individual investor? It's first important to note that the above platforms can help the individual, too, albeit indirectly. By making trading between institutions more efficient, the market should become more efficient in the overall

process and thereby benefit individual investors. Moreover, in many cases, individual investors may conduct their bond transactions with broker-dealers who may utilize electronic platforms to facilitate the transaction, thus benefiting the individual investors. Individuals can also benefit from using the single-dealer system, if their broker-dealer makes the system available to them.

Middleware Trading Platforms

There are also a number of Web sites that offer bond trading utilizing a database of securities from numerous contributing broker-dealers. These broker-dealers regularly submit their inventories to companies such as ValuBond's Bond Express, a firm that helps facilitate transactions by providing a searchable database to firms that wish to offer bond trading to the investing public. Some of these firms are purely Internet firms that have entered the realm of electronic trading in hopes of earning a profit. In other cases, small broker-dealer firms that either lack the resources to build a trading system of their own or have too few securities in their bond inventory turn to companies such as ValuBond to establish a foothold in electronic trading.

There are a few advantages and disadvantages to using systems provided by these so-called middlewares. A key advantage is that they enable investors to choose from a far larger database of securities than they would find if they went directly to a small number of broker-dealers. This is especially true in the municipal and corporate bond markets where finding bonds with specific characteristics can be extremely difficult at times.

A second advantage of systems that utilize a database of bonds is the ability it gives investors to search for bonds that fit their specific criteria. Using this system, an investor can conduct a bond search that is made to order. An investor can search for bonds with a specific maturity date, coupon rate, credit rating, price, yield, call protection, among other details.

A third advantage is that the systems enable investors to track and compare prices on bonds. This can be a big help to bond investors who have often traded in the dark, so to speak, with no way of knowing whether the prices they were being quoted were an accurate reflection of the true market price.

One of the main disadvantages of systems that rely upon databases of inventories is that there are often multiple entities involved in a transaction.

This can thereby raise the actual or implied transaction costs of executing orders on the system. For example, when a bond investor decides to purchase a bond on a Web site that uses this type of system, there are likely to be at least two entities with their hands in the kitty. For one, the Web-based company that sells the bond to the investor will mark up the price of the bond in order to earn a profit from the transaction. The price of the bond will be marked up a second time to reflect the markup that had to be paid to obtain the bond from the broker-dealer who listed the bond in the database. Remember, the online brokers do not carry their own inventory. To top it off, online brokers often charge a commission, adding to the cost of the transaction.

Despite the disadvantages, the advantages seem to prevail. One key reason for this is that there are often layers of entities involved in transactions conducted offline too. In addition, the increased transparency can help investors to get a better price on the bonds they buy and sell. Moreover, investors are more likely to find bonds they're interested in using an online search engine designed to find bonds based on an investor's specifications.

In light of the progress made to date and the considerable degree of progress that lies ahead, online bond trading seems poised to continue growing sharply in the years ahead, and the Internet seems likely to become the venue for the central marketplace that the bond market has never had.

THE BILL MARKET

The bill market is the one sector of the government market that is truly part of the money market, since short coupons are not as actively traded as are bills, particularly when their maturities are similar. We noted earlier that the daily trading volume in 3-month bills was roughly 50% greater than that of the 2-year note, for example.

Bill Auctions

The cast of bidders in a typical bill auction is varied. In March 2006, the Fed held in its portfolio \$274 billion of bills, some portion of which matures each week. The Fed replaces some or all of its maturing bills by *rolling* them in the auction; it never bids for bills in the auction to increase

the size of its portfolio. To add to its portfolio, the Fed buys bills in the secondary market from dealers.⁸

Because of the U.S. dollar's reserve status, the world's central banks have large holdings of dollars, and many of these dollars are invested in Treasuries. In the past, one of the more favored places for foreign central banks to put their dollars to work was the bill market, but these days foreign central banks hold many more notes and bonds than they do bills. In December 2005, of the \$1.251 trillion of Treasuries held by foreign official accounts, \$1.049 trillion were held in notes and bonds, and \$201.9 billion were held in bills.

Besides the dealers, other major players in bills are banks, money funds, state and local governments, insurance companies, pension funds, and individuals. Some of these investors also purchase bills indirectly, via their holdings of money funds. At the end of 2005, there was \$2 trillion in money market mutual fund shares outstanding. The figure was actually 10% higher several years earlier before investors fled in search of higher-yielding assets given the low interest-rate environment that prevailed at that time.

Before the auction, there is a buzz of auction talk among the dealers. Dealers know the size of the issues the Treasury is offering, and they try to assess the retail interest in these issues and what amounts other dealers are likely to bid for. That is the sort of information traders require to hone their bid down to the last decimal point.

Much of the talk between dealers before the auction focuses on what the stop-out yield will be, the bid-to-cover ratio, the number of indirect bidders, and the *tail* in the auction; in a bill auction the tail is the difference between the average yield that was bid and lowest bid (highest yield) accepted in the auction. Dealers bidding on bills all want to hit the tail, which takes skill. On an auction day, one dealer noted: "Today I do not want to buy much. I am just trying to bid for where I think the tail will be. I am bidding for practice, to see if my market reading is accurate. You have to keep in touch because, when you really want to buy, you need to have the confidence." The highest accepted rate is called the "stop," and all tenders at a lower rate than the stop are filled in full. Bids placed at the stop are prorated until the Treasury has reached its auction sale objective.

8 To prevent the Fed from becoming a money-printing machine for the Treasury, the Fed has long been forbidden to buy—except on a rollover basis—other than small amounts of new Treasury debt directly from the Treasury. This prohibition has, under current institutional arrangements, no effect whatsoever on the size of the Fed's portfolio or on the amount of bank reserves it creates.

All bids placed above the stop go unfilled. The invoice price for all accepted competitive and noncompetitive bids are computed from the stop, rounded to three digits.

The final moment of decision for a dealer comes just before the auction deadline at 1 p.m. Then time runs out. She has to enter her bid via the TAAPS system at the last moment. Once all the bids are received, results are released within two minutes of the auction deadline. This is a major improvement over years ago when results weren't known until 6:00 p.m. Table 14.4 shows the results of a bill auction held March 13, 2006, for settlement on March 16, 2006.

TABLE 14.4

Sample results of 3-month bill auction

RESULTS OF TREASURY'S AUCTION OF 13-WEEK BILLS

Term: 91-Day Bill
Issue Date: March 16, 2006
Maturity Date: June 15, 2006
CUSIP Number: 912795XG1

High Rate: 4.510% Investment Rate¹: 4.625%; Price: 98.859972

All noncompetitive and successful competitive bidders were awarded securities at the high rate. Tenders at the high discount rate were allotted 63.27%. All tenders at lower rates were accepted in full.

AMOUNTS TENDERED AND ACCEPTED (in thousands)

Tender Type	Tendered	Accepted
Competitive	\$50,404,197	\$18,666,580
Noncompetitive	2,138,023	2,138,023
FIMA (noncompetitive)	196,000	196,000
SUBTOTAL	52,738,220	21,000,603²
Federal Reserve	6,727,574	6,727,574
TOTAL	\$59,465,794	\$27,728,177

Bid-to-cover ratio = 52,738,220 / 21,000,603 = 2.51

¹ Equivalent coupon-issue yield.

² Awards to Treasury direct = \$1,428,000,000.

Supply in Treasury auctions varies from week to week and from month to month. At times when Treasury receipts are running higher than projections, the Treasury will sell fewer bills than the number of those that are maturing. At other times, it will increase the size of the regular weekly bill auctions. Supply offered also varies from one note or bond auction to another.

Dealers act in part as distributors of the Treasury debt. How much distribution is required on a new issue depends on the relationship between the supply offered and demand by retail. When the Treasury is auctioning new securities, it is likely that the new issue will sell at a fractionally higher yield than trend until the supply is distributed, and dealers consequently have a profit incentive to bid aggressively in the auction. When the reverse is true, there is both less need for the dealers to act as distributors and less profit incentive for them to bid aggressively in the auction.

Bill Supply

There is no shortage of bills in the sense that bills can't be bought at any price. In gauging the shortness of the supply of bills, looking at total bills applied for in an auction can be misleading. That number is meaningless; the Fed expects primary dealers to give a bid, but their bid needn't be close to the market. Thus, a dealer who doesn't want to buy bills might bid a lower price. A number that is meaningful is how many of the bills sold in an auction get to the Street. Table 14.5 shows that, in the auction on March 13, 2006, the Fed, and indirect and noncompetitive bidders took big chunks of the new 3- and 6-month bills sold. (Noncompetitive bids, which are limited to \$5 million or less, include bids by individuals and others who take bills out of the market and are unlikely to put them back in. The indirect bids include customers placing competitive bids through a direct submitter, including foreign and international monetary authorities placing bids through the Federal Reserve Bank of New York.) *Net*, in the auction described in Table 14.5, \$12.502 billion of the 3-month bills and \$12.552 billion of the 6-month bills sold found their way to the Street. If these amounts were split evenly among the primary and aspiring dealers, each would end up with a small amount relative to worldwide demand for bills. That's one sense in which there is a bill "shortage."

To put the above numbers in perspective, consider that billions of dollars of T-bills were traded daily at around the time of the auction.

TABLE 14.5**Breakdown of composition of auction participants**

13-WEEK BILLS CUSIP:912795XG1 (amounts in thousands)		
Tender Type	Tendered	Accepted
Primary dealer ¹	\$40,531,000	\$12,502,435
Direct bidder ²	2,135,000	289,088
Indirect bidder ³	7,738,197	5,875,057
Total competitive	\$50,404,197	\$18,666,580
26-WEEK BILLS CUSIP:912795XV8 (amounts in thousands)		
Tender Type	Tendered	Accepted
Primary dealer ¹	\$30,726,000	\$12,552,560
Direct bidder ²	970,000	140,000
Indirect bidder ³	6,026,000	4,397,360
Total competitive	\$37,722,000	\$17,089,920

¹ Primary dealers as submitters bidding for their own house accounts.

² Nonprimary dealers as submitters bidding for their own house accounts.

³ Customers placing competitive bids through a direct submitter, including foreign and international monetary authorities placing bids through the New York Federal Reserve Bank.

Source: U.S. Treasury Department

While only a portion of these trades would be with retail, these traders are likely, during the course of a day, to do many large trades with corporations and with money funds, each of which might run into the hundreds of millions of dollars, and they also do big trades with state and local government bodies and with foreign central banks. Bills in general have a great deal of natural demand from investors around the globe. This is why they are so active and why we say that there is a “shortage” of bills.

Another point of interest concerns what the Fed did. The Fed may apply in an auction for sufficient bills to roll its maturing bills, but nothing requires it to buy that many bills. In the March 13, 2006, auction, the Fed rolled \$6.87 billion 3-month bills and \$6.978 billion 6-month bills, despite having \$15.815 billion of bills maturing on the March 16, 2006, settlement date.

In other words, the Fed chose not to roll \$1.967 billion of bills, perhaps because the Fed felt there were enough reserves in the banking system to hold the funds rate at the Fed's target rate. By opting not to roll all of its maturing bills, the Fed drained, without benefit of open market operations, \$1.967 billion of permanent reserves.

Daily Trading

Bills are quoted in 01s. Thus, a trader's market in a given bill might be 4.50 offered and 4.51 bid. In the interdealer market, traders often refine their bids and offers to half an 01 by using pluses; a bid of 51+ means that the trader is bidding 51½ bp (basis points). The *handle*, 4 in the above discussion, is never quoted.

A broker's quote in the bill market might be: "3-month, 50-49, 5 by 10; 6-month at this juncture 70 locked, \$20 million up." When a broker quotes the size of the market as "5 by 10," she means that \$5 million are bid and \$10 million offered. When size is "\$20 million up," that means both the bid and the offer are good for \$20 million. Sometimes, dealers will make their bids and offers on an all-or-none basis. If the dealer bids for \$5 million AON (all or nothing), no one can hit that bid for less than \$5 million. Sometimes, there will be a bid on an issue but no offer. In that case, the broker would quote the market, for example, as "70 bid without."

Although the average size of bill trades tends to be greater than for other Treasuries, they are not traded as frequently. Fleming found that during the period December 30, 1996, to March 31, 2000, 3-month bills traded an average of 56 times per day, and 6-month bills traded an average of 51 times per day, based on data from GovPX.⁹ That is much smaller than trading on the 5-year note, which was the frequently most traded issue at 688 times per day. The same study found that the average bid-ask spread for 3-month bills was 0.71 of a basis point, and for 6-month bills it was 0.74 of a basis point, based on data from GovPX during the same time period. For the 10-year note, the average bid-ask spread was $\frac{78}{32}$ of a point. Quote sizes averaged \$16.9 million for 3-month bills and \$15.5 billion for 6-month bills, compared to \$7.9 billion for 10-year notes.

⁹ Michael Fleming, "Measuring Treasury Market Liquidity," Federal Reserve Bank of New York, *Economic Policy Review*, September 2003, 9(3), pp. 83–108.

The Real Market

Bids in the brokers' market may or may not always reflect the *real market*, that is, the bid and offered prices at which large trades can easily be done. One trader commented: "I think in part of the real market as the market away from the brokers. If I were to go to a retail account who owns bills I want, what would I have to pay to buy them on a swap, what would it cost me to get them from him to me?"

"At times, quotes in the brokers' market are distortions of the market because they are created to be misleading. Suppose I want to buy \$100 million of a particular bill. I know that everyone is looking at the brokers' market. So what do I do? I make a one-man market. I make them 85 locked, 5 up on both sides. Now I go around and call the dealers and ask them for a market in that bill, and they will make it 85-83 or 86-84. I will buy them at 83 or 84, and then I will take my market out [of the brokers' screen] after I have bought what I needed. Then, if I want, I can put another market in, and that becomes the market. These are the games played by traders. If you want to buy or sell, you try to distort what you really want to do. Depending on the market, this can be done at times with some success.

"Of course, when I put a locked bid with the brokers, I have to stand up to both sides. It might not work. I might lock the market and get myself immediately lifted. If I wanted to buy, that would ruin that act; and now I would have to buy another \$5 million. You cannot lock too far from the real market. But remember, we are talking about distorting the market an 01 or half an 01. That pays because I am trading big volume.

"If a dealer does not know if the market on a broker's screen is the real market, he has to spend some money to find out—to buy or sell to find out how real the bid or offered side is in terms of size. If he spends \$10 million on bills and they are reoffered, then he knows that there is a genuine seller there. If he buys 5 and that is all he can buy, then maybe that is not the real market. Maybe the market is just holding up because the bid is stronger than the offer."

Bills have long been traded on a when-issued (WI) basis between the auction and settlement dates. Some years ago, the custom developed of trading bills WI after they are announced but before they are auctioned. Because of this practice, the most recently announced *and* the most recently auctioned 3-month bill will both trade WI for several days in the middle of each week. During this period, traders refer to the most recently

announced 3-month bill as the WI bill even if the most recently auctioned 3-month bill is still trading WI.

In bills, WI trading is very active both between dealers and between dealers and retail. For a trader who wants to short the market, selling bills trading WI is more attractive than shorting an outstanding issue, because on a WI sale delivery need not be made immediately, and a WI sale is thus simpler and cheaper than an ordinary short sale. Also, a bill trader who remains bearish and wants to keep on her short can do so by constantly rolling that short, week to week, in the WI market. That way she never gets involved in the cost of borrowing, which eats into the profitability of a short.

For a dealer who wants to trade 3-month bills, buying them WI is at times the only way she can do so without incurring a negative carry. Suppose, for example, that fed funds are 4.50, the repo rate on governments are at 4.45, and the 3-month bill is trading at 4.30 on a discount basis, that is, at 4.41 on a bond equivalent yield. If a trader buys that bill and finances it, she'll have negative carry. Still, a lot of people like to trade that bill, so they will trade it in the WI market where carry is in effect zero.

Trading on a WI basis before the auction serves other useful purposes. Noted one dealer, "A lot of regional firms trade the WI market actively. Before the advent of such trading, the recognized dealers with brokers' wires were able to engineer auctions because people outside the New York dealer community were not sure where the market was. So if three guys got together, they could—in the talk before the auction—push it an 01 or an 02 and buy most of the auction." Now with WI trading and price transparency at new heights, the regional firms know where the market is because the bill has been trading WI for three or four days before the auction. It helps the auction process that often people who do not like the market will build up a short going into the auction, so half the issue is really taken care of before the 1 p.m. auction deadline. This helps to stabilize the market when a new issue is brought to market.

Weekly Cycle

There tends to be something of a weekly cycle in the way the bill currently being auctioned trades, although the cycle is mostly visible to traders and not easily discernible to most investors. "On Monday," one trader noted, "you have the auction. Then Tuesday, right after the auction, you generally do not see too much price improvement unless it was a very aggressive auction or some extraordinary event affects the market; on Tuesday, the market

performs sloppily because you have people who can sell the issue whether they have it or not. On Wednesday, there is a day to go [before settlement], and people who are short start to think—shall I take my short in or not; and the market tends to behave a little better. Then Thursday, you have demand. The shorters have to cover or borrow, which is expensive. Also, the previous bill matures, and people who have not rolled over in the auction have to put their money to work, so they go and invest in the new bills. This is the busiest day. Then Friday it tails off a bit.”

Technical Factors

Bill traders, like other traders of governments, engage in technical analysis. Ask a bill trader at a major shop about this, and she might punch up a chart on the daily price activity in the bill market. Some will use trend lines, others Fibonacci levels, moving averages, or relative strength indicators.

“I have to look at technicals,” noted one bill trader, “because other people do. However, you don’t get the same gapping in bills that you do in bonds when rates reach a certain level. Bills are more placed where the bond is more traded by speculators. In bills, fundamental supply and demand are more important. Most important are the level of the fed funds rate and the level of short-term interest rates worldwide.”

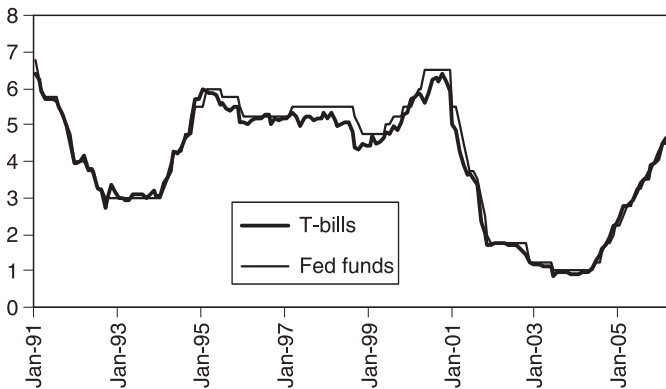
Figure 14.5 shows this. In June 2003, the 3-month T-bill rate fell to as low as 0.8%, reflecting the 1% fed funds rate that the Fed put in place that same month when it cut interest rates for the last time in that interest-rate cycle. By October 2006, 3-month bills were yielding 5.12%, reflecting the 5.25% funds rate that prevailed at that time. The message is clear: while technical factors can be influential, they are no match for the influence that the funds rate exerts on the bill market.

A Place to Build Volume

To become a primary dealer, the Federal Reserve requires that a dealer do 1% of retail business as measured by the Fed. The easiest and cheapest way to do such business is in the bill market because profits and losses there are so small. In the 1980s, when the dealer community was growing, the bill market became very difficult to trade. “A customer would ask for an offering,” commented one trader, “and I wanted to sell them because I owned them, so I would offer at the bid side, at 46½, and I would miss at 47½. Someone was paying an 01 to buy that business.”

FIGURE 14.5

T-bills track the funds rate—3-month bills versus fed funds rate



Sources: Federal Reserve, Bloomberg

This has changed over the years. Dealers have got their lines to the Fed, and they are more resistant about taking losses, especially with many firms having gone public. Now, the market is a lot saner, and dealers do not have to sell through the market to do business with retail. These days the daily volume traded in Treasuries is so great that dealers find it easier to be 1% of the volume, especially given the sharp decline in the number of primary dealers over the past decade.

Quotes to Retail and Protocols

When a good trader gives quotes to retail, she will not simply *bracket* the brokers' market—quote a bid slightly above that in the brokers' market and an offer slightly below that in the brokers' market. She will quote on the basis of her own perception as to where the real market is. Also, her quotes will be influenced by the size she wants to do or retail wants to do.

One dealer commented, "Say I wanted to buy size in an issue. The bid in the brokers' market is 20-18, 10 by 5. I might bid 17 to retail for \$50 million. That's an 01 less than the offered rate in the brokers' market, but there I can buy only 5 not 50."

If a retail customer has a lot she wants to buy or sell and she wants to get the job done properly, there are certain protocols she should follow. Say she is a big seller; she should be reasonably open with a single dealer

and get that dealer to work for her—to try to retail what she is selling piece by piece to people who might be buyers. Sometimes, a big seller will hit every bid around for \$30 or \$40 million, the market gets swamped, and the dealers all end up competing with each other to unload these securities. A customer who sells that way gets a reputation and won't get the same treatment from dealers the next time.

The dealer is also expected to be fair with retail. Said one, "A professional dealer won't move the market on a customer who tells him he's a big buyer or seller." Another dealer commented, "Say I want to sell \$100 million of an issue; the World Bank comes in and wants to sell to me and the market is 84-3; I will make him 86-5. He will know right away I am not his person. He will know I am trying to sell. I will be open with him—tell him I am not in a position to help him because I too have a position to unwind."

The protocol of openness does not apply between dealers. If a dealer is trying to sell in size, she will attempt to hide that from other dealers—to try, for example, to play the games described above to distort the market and cloak her true intent.

The 90-Day Bill Rate

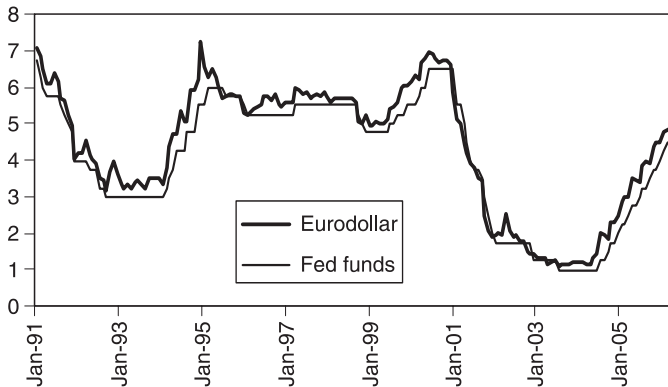
The Fed directly influences a single interest rate, the fed funds rate. In doing so, however, it strongly affects the level and pattern of other short-term interest rates. As is shown in Figure 14.5, the 90-day bill rate is closely correlated to the fed funds rate, and there are other rates that key off of it, too; as the fed funds rate changes, the whole structure of short-term interest rates changes.

Today, the linkage between the fed funds rate and the rate on 3-month bills remains strong, but the 3-month bill rate is no longer the bellwether rate it once was, largely because investors are focusing more these days on the Fed, which now gives clearer indications on what to expect next on the rate front. In addition, market interest rates have been increasingly influenced by international capital flows, with foreign investors owning about half of Treasuries, so investors are putting more of their focus overseas than they used to. Investment flows from abroad have become so large that capital flows have been cited as one explanation for the low level of long-term interest rates that prevailed in 2005 and early 2006 despite numerous Fed rate hikes.

Figure 14.6 shows that the 3-month Eurodollar rate is also closely correlated to the funds rate. As would be expected, the spread of Eurodollars to fed funds tends to narrow when rates are falling and to

FIGURE 14.6

3-month Eurodollar versus fed funds rate



Sources: Federal Reserve, Bloomberg

widen when rates are rising. Rates at which money market instruments trade are often evaluated in terms of the spread at which they trade to Eurodollar rates, which reflect the London Interbank Offering Rate (LIBOR). Eurodollar rates have thus replaced bill rates as the benchmarks that investors use to gauge relative value.

Short bills were once not very actively traded, perhaps because the principal buyers of them were corporate treasurers, banks collateralizing government deposits, bank trust departments, and other investors who tended to be hold-until-maturity investors. Of these, the corporate treasurer at least is likely to have moved out of short bills into commercial paper where she gets a better rate.

Today, the yield curve in bills tends to be relatively steep at the very short end because of people putting away short bills—their doing so dries up supply. However, a lot of other people are out there trading huge amounts of bills right up until they mature. For example, money funds have large holdings of short bills, and as soon as they own a bill that is rich compared to the bill next to it, they sometimes swap.

Short bills do especially well whenever there is uncertainty in the market. A flight to quality will always drive down the rates on such bills. For example, following Russia's default on its debt obligations in 1998, bill rates plunged. The yield on the 3-month bill fell from 4.80% to 3.60% in a matter of weeks. That was a much larger decline than the yield decline

in the 10-year note, which was only about half as much. Even if the Fed appears to be tightening at the time of a flight to quality, investors like short bills; they reason that, if they are in something that is very short, a rise in interest rates won't hurt them much in terms of capital losses.

In a dealership, trainees are sometimes given the job of trading short bills. The market for short bills is quite stable so they can't lose much money, and trading these bills gives them an opportunity to learn the *lingua franca* and other fundamentals of bill trading before they go on to trade longer bills, which is where the action and risk are.

TREASURY NOTES

The market for notes is the largest part of the Treasury market. At the end of February 2006, there were \$2.39 trillion of notes outstanding, much more than bills, at \$997 billion, and bonds, at \$526 billion. The note market is also the Treasury market's most active segment in terms of both the number of trades that are transacted on a daily basis and the dollar amount of securities traded (Fleming, 2003).

The note market is also the most active segment of the Treasury market in the futures market. Bills don't trade, and bonds are much less active than notes. For example, in early March 2006, roughly 1 million 10-year note contracts were trading daily, and the open interest was 2.1 million contracts, much more than for bonds, which saw volume of roughly 400,000 contracts, and open interest of about 600,000 contracts. Volume and open interest were also greater in the 5-year note, at 700,000 and 1.2 million, respectively. We discuss the futures market in greater depth in Chapters 15 and 16.

The activities of a note trader closely resemble in some ways those of a bill trader but differ sharply in others, because notes trade differently from bills. In the note market, yields are quoted in 32nds, but quotes can be refined to 64ths through the use of *pluses*; an 8+ bid, for example, means that the bid is eight and one-half 32nds, which is $17/64$. The normal spread between the bid and asked for notes varies by maturity. The spread tends to widen the longer the maturity, as we noted earlier in the discussion on bills. Quotes on notes are normally good for \$1 million, but much larger and smaller trades are also executed.

Most large shops have a number of people trading notes. A junior trader may be responsible for trading notes with a current maturity of 0 to 18 or 21 months, an area in which it is more difficult to lose a lot of money. Several more senior people will trade longer notes.

Trading Notes

As the largest and most active segment of the Treasury market, the note market is influenced by an extraordinarily high number of variables and is thus a very complex market to trade. That said, the most influential of these variables is fairly well defined, and the market tends to be relatively efficient, which in ways reduces this complexity.

A fair, if oversimplified, way to describe how shops used to trade coupons would be to say that they bought notes when they were bullish, shorted them when they were bearish, and had a specialist arbitrageur who sought at all times to profit from rate anomalies.

Today, note traders must weigh variables that literally stretch across the globe. Luckily for traders of U.S. notes, most of what moves the Treasury note market emanates from the United States, although this does not mean that simply following the U.S. picture will suffice. The large amount of volatility seen during the Asian financial crisis of 1997–1998 and the Russian default of 1998 is clear evidence of the very large impact that events abroad can have on the U.S. Treasury market. Still, the influence doesn't cut both ways as much as some think. Goldberg and Leonard showed this in a study that analyzed the effects of economic news on U.S. and German yields during the period January 3, 2000, to June 2, 2002.¹⁰ The study found that U.S. economic data had a greater effect on German 2- and 10-year yields than many German releases did and that German and euro-area economic announcements were far less influential on yields in the U.S. Treasury market.

Nevertheless, the number of variables that affect the note market is extraordinary. The most important of these are those that could and do affect the actions of the Federal Reserve. Particularly influential are releases of economic news, which move world markets more than any other factor. Goldberg and Leonard (2003) found that the economic releases that moved the German note market most were the monthly employment data and the quarterly release of the advance estimate of the gross domestic product (GDP), which tended to spur moves of 3 basis points in the German 2-year note for every one standard-deviation surprise in the releases compared to the consensus forecast. Surprises of this magnitude in the Michigan and Conference Board consumer confidence surveys, the employment cost

¹⁰ Linda Goldberg and Deborah Leonard, "What Moves Sovereign Bond Markets?: The Effects of Economic News on U.S. and German Yields," Federal Reserve Bank of New York, *Current Issues in Economics and Finance*, 9 (9), September 2003.

index, the purchasing managers' surveys, retail sales, and the unemployment rate explained moves of more than 2 basis points in 2-year note yields and moves of at least 1 basis point in 10-year note yields. Interestingly, surprises in the U.S. producer price index had a larger impact on yields than did the U.S. consumer price index, possibly because of Germany's greater reliance on factory activity. Most German economic news had virtually no impact on U.S. rates, with only the German retail sales report having a statistically important effect. For the U.S. 10-year note, the only euro-area news that moved it in a statistically important way was the flash estimate of euro-area consumer price index, and reports on German manufacturing orders.

How Data and Announcements Affect Trading

The bond market's focus on economic data is almost always intense, but the specific economic reports that get the most attention vary quite often. Occasionally, data that rarely are given more than a passing glance suddenly become a large force in shaping the bond market's direction. At other times big market movers such as the employment report carry little weight in shaping its direction. It is therefore important to be open-minded and flexible when weighing the potential impact of a set of economic reports.

Just prior to a recession, for example, bond investors tend to put a great deal of weight on the employment report because weakness in that report is a prelude to a recession. In fact it is a key criterion in the designation of the timing of the start of a recession. As a result, the market response to weak employment data released during the period leading up to a recession tends to be quite sharp. And since the market also moves in advance of the release of the report as well as afterward, the cumulative response can be quite large. Importantly, however, there comes a point when bond investors start to look beyond the weakness and begin to anticipate an eventual recovery. Markets, after all, are known to anticipate and discount events before they occur. Investors therefore begin to look at the employment report as a lagging indicator. They recognize that if the underlying demand for goods and services were to begin to improve, employers will not quickly rehire workers until the pickup in demand is sustained. In this way, employment conditions can be a lagging indicator, or an indicator that lags behind actual turning points in the economy. Similarly, when the economy suddenly weakens following several years of expansion, employers do not generally let go of workers just because

they had a bad month or two. They first want to be sure that the trend will be sustained before they consider layoffs.

There are many different situations in which the market's focus will change, and changes can occur frequently. It's therefore important to look several steps ahead at the chain of events that will affect the economy in future months. It is not enough to look at the economy's current problems. In the way Wall Street works, that is like looking at the past. Instead, one must first identify the economy's key problems or its key underpinnings and try to envision the chain of events that could alter its direction. The best way to accomplish this is to recognize that behind each economic event are a series of other events. Once a trader or investor recognizes the large degree of connectivity that exists in the economy, forecasting will be easier. It is therefore important to envision the series of events that could occur and simultaneously envision the market response to both the individual events and the series of events. It's especially important to relate developments in the economy to the markets; *you can't put being right in the bank*. One must apply her sense of the data to the markets in order to profit from accurate economic forecasts. This is why it is important for traders to be open-minded. Investors change their focus frequently. What's important to investors today could mean much less to them tomorrow and vice versa.

In Chapter 9 we discuss the enormous influence that the Federal Reserve has on the Treasury market, from speeches to rate changes. We now turn our attention to the economic news that affects the bond market.

As we said earlier, what influences the bond market one day may influence it to a lesser degree the next day and vice versa. Consistent, however, is the impact that changes in inflation expectations have on the bond market. Most times, yields fluctuate in response to data that *might* affect the inflation rates, given that most economic data contain *implications* for inflation and are not themselves reports on inflation. Inflation, after all, is the bane of the bond market because it erodes the value of the cash flows associated with fixed-income securities. Yields are therefore greatly affected by inflation expectations, which are influenced daily by many factors.

The inflation data are enormously influential on the Treasury market. Fleming and Remolona¹¹ found that of the 25 largest price changes and

¹¹ Michael J. Fleming and Eli M. Remolona, "What Moves the Bond Market," Federal Reserve Bank of New York, *Economic Policy Review*, December 1997.

the 25 most active trading episodes from every five-minute interval across the global trading of Treasuries from August 23, 1993, to August 19, 1994, all occurred on days when, following announcements, generally economic news but also Treasury auction results, for example. Moreover, all but one of these came within 15 minutes of an announcement's release. Treasury auction results were found to have a significant market impact. Second, the response to four announcements—the National Association of Purchasing Managers (NAPM) survey [now known as the Institute for Supply Management (ISM)], 5-year note auction results, industrial production and capacity utilizations, and consumer confidence—was so consistent that these announcements are significant even when absent from the 25 largest price shocks. In order of importance, Fleming and Remolona found that the following generated significant activity: (1) employment, (2) Federal Open Market Committee announcements, (3) 30-year T-bond auction results, (4) the producer price index (PPI), (5) 10-year T-note auction results, (6) CPI, (7) NAPM survey, (8) GDP, and (9) retail sales.

Real Yields

As noted above, traders and investors care a great deal about inflation, and their inflation outlook is influenced a great deal by a variety of economic data. When yields fluctuate in response to economic news, it could be said that real yields are adjusting to reflect adjustments to the bond market's inflation outlook. The *real yield* on a fixed-income security is its stated, or quoted, yield to maturity minus the current rate of inflation. There's almost always some real yield incorporated into bond yields. This is largely because investors want compensation for the risks they take in parting with their money. Moreover, in a world in which investment choices seem limitless, borrowers recognize that they must provide compensation (via some amount of real yield) to entice investors to buy their bonds. It could be said, then, that a significant explanation for the ups and downs in note prices reflects adjustments to real yields. Just how much compensation investors will require in real yields for the risks that they take and for the opportunity costs they bear varies depending upon a wide variety of factors.

It's in these variations in real yields that there are also important messages about the overall market that can be of value to those who trade fixed-income securities, and other securities, for that matter. Put simply, the fluctuations in real yields contain messages about the bond market, the economy, and other asset classes that aren't necessarily evident in nominal rates.

Similar to the way in which equity investors look at P/E's (price-to-earnings ratios) and other ratios using a historical perspective in order to draw conclusions about the value of stocks and/or the market on any given day, is how investors view the bond market. By looking at where real yields have stood in the past, we can more readily answer the question: is the market overvalued or undervalued? Real rates can give the fixed-income investor good perspective on whether bond market yields are too high or too low for a given set of fundamentals. They provide a quick and simple method of valuing a bond. Following are a couple of examples.

Say, for instance, that the nominal yield on a 10-year U.S. Treasury note moves from 8% to 6% over a period of three years. On the surface, the yield decline might lead some investors to shy away from investing in the 10-year T-note on the notion that rates have fallen to unattractive levels. After all, the yield decline in this case is quite substantial. But investors who approach it this way are being disillusioned, and they are probably not putting their focus where it should be—on real rates. In this example, if the inflation rate over the three-year period fell from 4% to 2%, real rates will have held steady at 4% ($8\% - 4\%$ and $6\% - 2\%$). Thus, while it is true that nominal yields became less attractive during the period, real yields became no less attractive.

In another example, consider a situation in which nominal rates rise to 7% from 6% but inflation also rises to 4% from 2%. In this case, some investors might be misled into thinking that, just because interest rates increased a full percentage point to 7%, that the investment is more attractive than when nominal rates were at 6%. The reality, however, is that the investment is less desirable than it was before because real rates fell to 3% from 4%. There is an obvious caveat to this, however. If in this example investors have a firm conviction that inflation will eventually fall and indeed it does fall, then investing when nominal rates are at 7% would be the more attractive investment.

Factors That Cause Real Yields to Fluctuate

There are many factors that determine the real yield on a fixed-income security. (For simplicity, we again focus on government bonds rather than corporate and other types.) Here is the list of factors:

- Inflation expectations
- Opportunity costs
- The economy's growth rate

- The Federal Reserve
- The federal budget
- Market liquidity

In the long run, the most important factor affecting real yields is the expected inflation rate. When inflation is falling or low, real yields tend to be low because investors are more willing to accept a low real yield on the expectation that inflation will either keep falling or stay low, thereby producing an acceptable return after inflation. On the other hand, investors will demand high real yields when they expect inflation to rise to offset the potential erosion of their capital. Bond investors are always cognizant of the risk that inflation could erode the value of their money and could even chew away their returns completely. As a result, when investors are concerned that inflation might accelerate, they demand a higher real rate of return to offset the inflation risks. The degree to which investors will demand compensation for inflation risks depends largely upon their most recent experience with inflation. In the early 1980s, for example, the double-digit inflation experienced in the 1970s lingered in investors' minds, resulting in very high real yields for several years after inflation peaked. Similarly, as the U.S. economy gathered momentum in 1994, bond investors drove real yields sharply higher partly out of fear that inflation would accelerate. It was a rational fear, given that inflation had climbed to over 6% at the end of the previous expansion in the late 1980s. But, as that fear of inflation proved to be false, real yields began to fall and, by the late 1990s, inflation seemed but a distant memory. Investors demanded very little compensation for inflation risks despite economic growth rates that would have caused bond investors to shudder with inflation concerns years earlier. Investors simply harbored few worries about inflation because their most recent experience led them to believe that inflation would not likely take place. When investors sense that the inflation rate is either falling or set to fall, they are generally willing to accept a lower real rate for a while in hopes that the inflation rate will decline.

A second important factor affecting real yields, and one that has had a big impact over the past decade, is the compensation that investors demand for the opportunity cost of investing in bonds compared to that of other financial assets, such as equities. Most bond investors recognize that investment returns on stocks have generally outpaced the returns on bonds. This is acceptable to most, of course, because bond investors generally invest in bonds simply to diversify their portfolio, provide an income

stream, and prudently add safety elements to their portfolio. Bond investors are therefore somewhat indifferent to the generally laggard returns on bonds compared to other asset classes. There is, however, a limit to this indifference: when the return on other asset classes far outpaces the returns on fixed-income securities and when it appears that the returns might be sustained, money will almost certainly be channeled away from the bond market. Bond investors won't pull out en masse, of course, but they will reduce their allocation to bonds to take advantage of better returns elsewhere. This reduced demand for bonds pushes up real yields. Bond investors simply want compensation for the opportunity costs they are incurring when the returns on other asset classes exceed the returns on bonds. Thus, when the competition for capital is high, bond investors demand higher real yields. This is precisely what happened in the late 1990s when a roaring stock market prevented real yields from falling as much as many felt they should have as a result of the elimination of the federal budget deficit, rising productivity rates, and disinflation. When returns on alternative investments sour, as occurred in the stock market in 2000 and 2001 as both the financial and economic bubbles burst, bond investors become less choosy. They turn their focus away from the return *on* capital to the return *of* capital. In this case, real yields fall, as investors basically settle for the low rate of return in exchange for the relative safety of bonds.

Trading Is Now More Complex

When talking to coupon traders these days, one hears them again and again speak about positioning and trading on a hedged basis where the hedge is often *generic*: The trader buys something—often a new issue at auction—and sells something else so that she views her net position as zero and has established an arbitrage or spread that promises to yield profits as well. The process is best described by quoting a few traders.

Said one, “A few years ago a major shop would easily run a billion position unhedged. Now the dealers have become arbitrageurs. Last week the Treasury sold 5 billion 5-years, and all of a sudden 2-years, 3-years, and 4-years were all over the place. The supply of these securities was created by shorts dealers put on so as to bid on the new 5-year note. Once we got done with the 5-year note auction, the 2s and 3s were still not going anyplace because the next auction down the pike was the year bill.” Whereas larger firms once took positions mostly on an outright basis, these days their positions are likely to be more complex, with their positions either hedged versus other maturities, or held against positions in

other segments of the bond market. For example, a trader might hold a long in Treasuries versus a short in corporates, or mortgages. At times, the plays dealers refer to as hedges are anything but pure hedges. Also, the lines between hedging, arbitraging, and trading have become fuzzy.

Another dealer, speaking of how dealer trading has changed, said, “I think you are seeing more generic hedging: ‘I like the yield curve or I like the market, so I will buy the short end of the curve and sell the longer end,’ or ‘I like the curve and the market, and there is supply coming in the longer end, so I will buy the short end and short the long end.’” It is also more common for dealers to use futures as a hedge, often generically, often because the futures market proves an easier venue to set a short quickly and efficiently. Which is cheaper at a given point will depend on several factors: the spread of cash to futures, transactions costs, and the cost of carrying a short (the reverse rate).

Today, it is hard to separate arbitrages and hedges. As one trader said, “No one consciously sits down and says, ‘I want to buy 2-years and sell long bonds.’ They might say, ‘I am going to buy the 2-year in the auction when they come, and if I have to sell something, I will sell the longer end because supply is coming there next week.’ Those are not arbs. They are generic plays along the yield curve based upon supply. They may or may not work.”

Hedging and arbitraging are practiced not only by coupon traders, but by bill traders as well. Said one, “Market volatility has led people to do a lot more arbitrage trading than outright risk trading. They still do the latter when market conditions seem right. However, there are now a lot more people making spread trades. Traders, for example, will buy a spread. There is a lot of spread trading going on in the cash market.”

In absorbing new supply, the Street still takes risks by not taking the big naked positions it used to. By learning to hedge its bets, the Street has become more efficient in distributing the debt. This explains in part how the market managed, even in years of highly volatile rates, to smoothly absorb ever-increasing amounts of new Treasury debt in all maturity ranges.

WI Trading

As is discussed earlier in the chapter in the section on auction procedures, when-issued (WI) trading helps to make auctions more competitive by enhancing the transparency of the market. Another major aspect of WI trading involves its distributional effects, or its impact on getting the newly auctioned securities distributed to buyers.

Notes have always been traded WI from auction to settlement. The Treasury used to forbid the trading of coupons WI during the period between announcement of a new issue and auction of that issue. The Treasury feared that such trading would be speculative and leave room for investors to be injured. Such fears were probably always groundless. In any case, the Treasury long ago switched its thinking. It concluded that it might save money by permitting new coupons to trade WI after an announcement, so it rescinded its ban on such trading.

This was a big innovation in the coupon market. Now, all new Treasury issues are routinely traded before they are auctioned. Since the Treasury auctions all its new coupons through yield auctions, traders who trade (on a yield basis) coupons WI before an auction are trading securities on which they don't know what the coupon will be.

Before a WI is announced, market participants assess what it should trade at once it is announced. There are three variables that are usually considered: curve, carry, and liquidity—the shape of the yield curve; the opportunity cost of buying the WI instead of an interest-bearing security with similar attributes; and the liquidity premium that will be embedded in the WI when it is issued. Each of these can usually be determined on the back of an envelope, but there are many who require a bit more precision. In considering the yield curve, investors calculate the yield difference between both the month and year that surround the WI. For example, for a WI 2-year note, if the yield spread between existing 2- and 3-year maturities is 12 basis points, investors will say that the new WI should trade 1 basis point higher than the 2-year issued a month prior to the new WI (because that is the average difference in yield per month). For carry, investors calculate the interest that they forgo for having bought the WI instead of an interest-bearing security, and then they convert the dollar difference into yield. Investors hence “demand” that the lost carry be built into the yield on the WI. Finally, investors consider the value of liquidity, which is more of an intangible and probably the most difficult part of valuing the WI. To do this, investors generally consider the amount of 32nds (or the fraction of a 32nd) that they feel the WI is worth. In other words, they consider how much more they would be willing to pay to own the most actively traded issue (which will be the WI once it is issued) instead of previously issued securities. After this final step, investors then tally up these figures on the value of the curve, carry, and liquidity, and price the *roll*, which is the yield difference between the WI and the yield

on the issue that the WI is replacing as the current issue for the respective maturity.

Current Issues

In the note market, an issue is current from the time it is auctioned until it is replaced by a new issue. Thus, the new 2-year note is current for a month, and new 3-year notes for a quarter. As previously noted, current issues, also known as *benchmark* or *on-the-run* issues trade much more actively than other issues until they become distributed or are replaced by a new issue (Fabozzi and Fleming, 2005).

Although notes range in original maturity from 2 to 10 years, there are only a small amount of current issues that are relatively new and actively traded at spreads that are narrow relative to spreads on older, *off-the-run* issues.

Many investors roll notes to stay in the current issue, just as they roll 3- or 6-month bills. Sometimes they will even give up a coupon just to stay in a note that is active enough so that they can get a bid on size in a market that is quiet or going down. Staying in the current note allows the investor to increase yield by moving out on the yield curve while still maintaining liquidity, although at times the new issue will yield less than the outgoing issue because of the existence of a liquidity premium. Dealers, too, like to position current issues because that is where market participants have an interest in buying and selling.

The importance of holding benchmark issues was never clearer than in the aftermath of Russia's default in the fall of 1998, peaking during the week ended October 16 of that year. Average yield spreads between the benchmark 5-year and off-the-run 5-year maturities widened to 15 basis points that week, and spreads between the on-the-run and off-the-run 10-year widened similarly (Fleming, 2003). This occurred despite the fact that there are no credit differences whatsoever between the maturities; they are all backed by the full faith and credit of the United States.

Another factor that may affect how well an issue trades is how closely it trades to par. "Old 10-years trade cheap to the new 10-year," noted one trader. "Recent off-the-run 10s—the 2nd, 3rd, and 4th previous issues—trade cheap to the active issue because they are less liquid. However, if an issue trades at par, that makes it attractive to a lot of people.

Par seems to be a magic number for money managers. To me as a dealer trying to make $\frac{1}{32}$, par means nothing.”

Profit in Trading with Retail

Today, big accounts will often put several dealers in competition when they want a big bid or offering, often resorting to electronic screens such as TradeWeb (discussed earlier in the chapter) to find the best bid or offer. When this occurs, the winning dealer will often be hard put to make any profit on the trade. Yet dealers do this sort of business. One 10-year note trader observed: “I do a lot of business at no profit. Why? I want to make the customer know that I am not an odd-lot trader. I can do the business, and I can get these guys to come back for other stuff when I am really involved. A lot of business in Treasuries is done for no profit, sometimes at negative profit. One reason is that a big shop like ours wants market share. Also, we want to see the customer business overall. Today, there are so many dealers, and we’ve all squeezed each other out. Consequently, Treasuries trade like a commodity, and there’s little profit to be made unless you are a tick trader like me.”

Short Coupons

Coupons with a current maturity of a year or less are not actively traded. One reason is that brokerage is much less on bills than on coupons. Some traders will actually refuse business in bills, unless it is for a good customer. Another reason is that the bill market naturally tends to be active because there are so many bill auctions.

Short coupons trade inactively also because it’s difficult for government dealers to staff all their major chairs, so they put rookie trainees on short coupons. Also, the older a coupon issue gets, the more likely it is that it will be tucked away by investors who plan to hold it until maturity.

Seasoning and Trading

Not all issues trade strictly on the yield curve. One of the reasons is the varying reception that different issues receive during and after the auction.

“It takes time,” one dealer noted, “for an issue to get well distributed, *seasoned*. How long depends on how well the auction went. Some auctions are sloppy and some are good. If in an auction, retail steps up and takes half

or three-quarters of an issue and they never intend to reoffer these securities so they are put away right off the bat, the float cleans up in a hurry. In other auctions, you have the opposite; the dealer fraternity by and large buys up the issue, it does not have anyone to sell them to, and it takes forever to get rid of them. That causes anomalies in the yield curve.”

Another trader noted, “If there is a lot of interest in an issue when it comes out, if it is large in size, and if it is widely distributed, it will continue to be actively traded. Profits can be taken, the issue becomes popular, and people buy and sell it. What counts is that there is sufficient size in trading hands—not necessarily dealers but investors who are willing to trade. It is also important that traders be able to borrow the issue. If they can’t, no one will short the issue, and it won’t be actively traded.” The trader brings up an important source of demand: repo traders. If an issue is perceived to be one that is likely to trade “special” (see Chapter 13) and hence provide opportunity for gaining profits in the repo market, the issue will be in high demand by repo traders.

Generally speaking, large issues tend to trade well because they are seen as likely to stay relatively liquid. There are many other factors that enter the equation, some of which are described below.

Notes versus Notes

A note trader is responsible for a large number of note issues, more than one person can actively follow. So the typical trader concentrates on a few issues in her area. “Once you know the issues you follow closely,” commented one trader, “there are relationships. In the 2-year area, if you know where the Junes are, you know where surrounding issues should be. Even if you do not trade the Julys for a week and you have a trade a day in the Junes, you know, if you are worth your salt, where the Julys should be.”

Prices are much more volatile in the coupon market than they are in the bill market because maturities, and hence durations, are longer. For this reason, dealers take smaller positions in coupons than they take in bills, and the coupon positions they assume become smaller the longer the current maturity of the securities positioned. One dealer commented, “If our bill trader is sitting there with \$100 million in bills, that might be equivalent in terms of risk exposure to a \$50 million position in 2-year notes and—in a normal market—to a \$10 million exposure in long bonds.”

Because a trader in governments is responsible for only a limited maturity spectrum, she is not in a position to arbitrage one sector of the market against another. That is a function typically carried on in a dealership

in a separate arbitrage account. However, a trader can and does attempt to arbitrage temporary anomalies along the yield curve in the sector she trades. “If I see a blip in the yield curve—the Julys are out of line with the Augusts—I will short the overpriced issue and buy the other,” noted one trader. “Generally, the payoff on this sort of thing is $\frac{1}{32}$ or $\frac{1}{16}$.”

There are many factors that affect the way in which notes trade relative to one another. One factor is the maturity date. For example, notes maturing at the end of December are likely to trade differently from notes that mature at the end of April or October, owing to factors related to year-end positioning. Notes that mature at the end of a calendar quarter are also apt to trade differently from other issues, other factors being equal, of course. Other factors that affect how issues trade include: the amounts outstanding; whether the issue trades above or below par; how the issues fared at auction; its coupon rate; and prospects for trading in the repo market.

Dealer Positions in Treasuries

A coupon trader has to be concerned about more than Fed policy and the fed funds rate. She also has to consider any factors that might affect the *technical factors* that affect supply and demand—in her market. The supply of securities is of course affected by the Treasury’s regular issuance of securities. It is also affected by factors that either increase or decrease the float of securities into and out of the secondary market. In this respect, the positions held by dealers have a significant impact.

Often, the dealer community will go net *short* in coupons. When dealers, as a group, short an area, they eventually must buy securities from retail to cover that short. Dealers put on shorts in anticipation of a decline in coupon prices; as part of an arbitrage (for example, they might short the 2-year note and buy the 5-year note—a *bull market arbitrage*); or as part of the hedge-type trades described above.

Table 14.6 shows dealers’ net positions in different areas of the Treasury yield curve. Any market watcher treads on dangerous ground if she tries to infer from such data just what dealers’ views on the market are: Are they bullish or bearish? Do they expect the yield curve to steepen, flatten, or invert? The reason it’s so difficult to figure out what dealers are thinking is that there are many different factors that may cause a dealer to short a given issue or segment of the bond market. One factor we don’t mention above is that traders of non-Treasury instruments often short Treasuries as a hedge. For example, a trader of mortgage backs may short 10-year or shorter Treasury notes as a hedge. Also, a dealer who runs

TABLE 14.6

Primary dealer positions in U.S. government securities as of close of trading on March 22, 2006 (in millions of dollars)

Type of Security	Net Outright Position
U.S. Government Securities	
Treasury bills	27,570
Coupon securities	
Due in 3 years or less	-44,164
Due in more than 3 years but less than or equal to 6 years	-43,547
Due in more than 6 years but less than or equal to 11 years	-36,362
Due in more than 11 years	-14,066
Treasury inflation-indexed securities (TIPS)	686
Total U.S. government securities	-109,883

Source: Federal Reserve Bank of New York

a book in interest swaps will routinely short Treasury bonds as a hedge. In this case, whenever the dealer does a coupon swap with a customer that makes the dealer a receiver of fixed, it lifts its hedge when it finds a home for the flip side of the swap, meaning that the dealers' position in Treasuries will shift from short to long, although not necessarily because the dealer was either bearish or bullish.

In fact, primary dealers customarily hold net short positions in Treasuries, not as a bearish bet on the Treasury market but as hedges against other fixed-income securities that they hold. Indeed, dealers were net short in every week during the 4½ years ending March 2006, averaging a net short of \$72 billion per week, most of which was spread out in maturities out to 10 years. For the most recent two years, dealers held a net short averaging \$109 billion per week. During both these periods, dealers were net long other segments of the bond market, particularly the corporate bond market. In the 4½ years ended March 2006, dealers averaged a net long of \$114 billion, and, in the most recent two years, dealers held a net long averaging \$151 billion per week. Dealers also tend to hold large net long positions in agency securities, averaging \$108 billion per week in the two years ending March 2006. Positions in the mortgage-backed securities market tend to be much smaller, averaging \$22 billion during the same period.

Whatever the reason for a given short, a lack of securities of the Street and a need to cover that short can cause a *technical rally* in coupons. One of the technical factors a note trader must constantly consider is what arbitrageurs might be doing in her area of the market. Commented one note trader: “Whenever something important—an economic or political development—that affects the market occurs, I have to think as much about what the arbitrages are going to do as about where the market in general is going. If I think our arbitrage guy is sitting there getting ready to buy 3-year notes and sell 5-year notes, I sure don’t want to be short the 3-year note even if I think that the market is going down.”

Brokers

Traders of government notes and bonds use the brokers fully as much as bill traders do, and for the same reasons. In the government market, as in other markets, one of the most important features of the brokers’ market is that, whenever something occurs to cause volatility in market activity, it serves as the arena in which trading is reestablished. It is part of the protocol of the dealer community that whenever something big—such as a move by the Fed, or employment data—has an impact on the market and causes uncertainty as to where issues should trade, dealers do not call one another to trade as they would in a more stable market. They do, however, look to the brokers’ market for bids and offers, and generally someone is doing something there. Gradually, as a few trades are conducted through the brokers, more bids and offers are put into the brokers, and a semblance of order in trading is reestablished.

Games

Traders play the same trading games in the brokers’ market and elsewhere that bill traders do. “Trading is much like a poker game,” said one note trader. “You try to bluff, to sound like a buyer when you are really a seller. You tell the guy you are in great shape for the market to go down when you are, in fact, long and hope he will buy some of your securities. When my boss says, ‘Let’s get down in position,’ the first thing I will do is put a bid in the brokers. The only way to get down is to find some help [create some buyers]. Sometimes, my bid will be low, and sometimes it will be good; if I get hit, I have a bigger job to do.

“I have the ability to use two brokers at a time. Say the market is 11+ 12+; I have notes offered at 11+ and can’t sell them. I will go out and buy them at 12+. Say I started with \$30 million I bought at 10. By buying \$5 million from another broker at a higher price than where I am willing to sell, I might lose $\frac{1}{32}$ on that \$5 million, but I now am much more likely to be able to get the other \$30 million I own off and make one or one and a half 32nds on them.”

BONDS

As of the end of February 2006, there were \$526 billion of publicly traded bonds outstanding, a tally that was much smaller than the \$2.4 trillion of notes outstanding, but a sizable total nonetheless. Treasury long bonds extend in maturity out as far as 30 years and are not part of the stock-in-trade of the money market, but we nonetheless dedicate some attention to them here in light of their prominent role in the Treasury market.

Long bonds are much more volatile in price than short instruments, and the risks in positioning them are commensurately greater. As a result it was always typical for traders of long governments to hedge the bulk of their positions. Especially before the advent of bond futures, many bond traders, if they bought a lot of long bonds from a customer and could not immediately resell them, would short a similar active issue and then wait and unwind the position when they could. In the view of some traders, such trading is wasted activity. Said one, “You should never end up with a security you do not want. If you buy such a security, you should sell it immediately. If you can’t because the issue is illiquid, you may have to sell another issue. Doing so, however, puts you in a poor position because you now have two issues that you can trade only when someone else has a need to trade them.”

Spreads and Active Issues

Expressed in 32nds, bid-ask spreads on Treasury bonds tend to be wider than for other Treasuries, especially for older bonds and when the overall market is volatile. The most actively traded bond—the current bond—generally has a bid-ask spread of about $\frac{2}{32}$ on a normal trading day, compared to a bit under $\frac{1}{32}$ or less for the 10-year note (see earlier discussion), and about a quarter of a 32nd for the 2-year note. Given the relatively

greater price volatility that exists for bonds in relation to other maturities, the spread would probably be wider if not for the liquidity provided by the futures market (the Chicago Board of Trade bond futures), where tens of billions of dollars worth of bonds trade daily. The notional value of bonds traded on a daily basis is sometimes more than the value of cash bonds that are traded. For example, in the week ended March 8, 2006, about \$40 billion of bonds were traded daily. That's also a relatively small amount compared to the \$634 billion that were traded for all Treasuries, and an amount smaller than the \$52 billion of bills that were traded.

Early on, the Treasury and the Fed viewed the initiation of trading in bond futures with a jaundiced eye; they feared various imagined abuses and undesirable consequences to which this new market might lead. In fact, the Chicago Board of Trade has been tremendously helpful in the distribution of new Treasury bond and note issues. If in any period there is \$1 billion of open interest, in most cases the billion short is the Street, the billion long is customers: high net worth and other individuals to whom the Board offers the opportunity to speculate on interest rates. The willingness of these individuals to speculate and their preference for taking long positions has permitted the Street to hedge huge positions on the Board. The ability to establish such hedges enables dealers to buy a new issue when the Treasury wants to sell it and to sell the issue—sometimes at a significantly later date—when retail wants to buy it.

As mentioned earlier in the chapter, the Treasury stopped issuing 30-year bonds in August 2001, partly in response to the steady lengthening of the average maturity of the Treasury debt, which had reached a high of 71 months in 2000 (Figure 14.3) at a time when the United States was running large budget surpluses. That level has since fallen to 53 months, and the United States is again running budget deficits. These factors, along with efforts globally at reforming ailing pension systems, have contributed to the Treasury's decision to resume issuance of 30-year bonds, with its first sale taking place in February 2006.

The most actively traded bond is the one that is the most recently issued. From August 2001 through February 2005 the Treasury did not issue any 30-year bonds, so the most active issue was the 30-year bond sold in August 2001, the 5 $\frac{3}{8}$ of February 2031.

Treasury bonds used to be callable during the last five years of their life. The last such issue that the Treasury sold was the 11 $\frac{3}{4}$ s of 2014, callable in 2009. Starting in 1985, the Treasury eliminated the call feature

from its bonds to facilitate the stripping of these securities into zeros (see STRIPS below).

The end users of securities, buyers who intend to hold them to maturity or at least stay with a given security for some period, will buy off-the-run securities on which they can get some pickup in yield.

Risk Analysis

Now that every trader thinks in terms of duration, which permits her to say that the directional risk in 10 bonds (\$10 million bonds) is the same as the directional risk in \$100 million year bills, it's easy to find a bond trader who prefers to measure her risk as being long or short \$ X million year bills and a 10-year note trader who prefers to measure her risk as being long or short \$ Y million long bonds. Traders seem to be most comfortable gauging their risk in units of whatever it was they first traded or traded longest, not necessarily in what they currently trade.

Dealing with Retail

The big buyers of long bonds tend to be insurance companies, pension managers (including certain state and local government bodies running pension funds), international investors, bond funds, and money managers out to maximize duration. Bank trust departments, to the extent that they buy shorter maturities, typically buy them in around the five-year range.

In trading with retail, a dealer's job is to facilitate flows. Since she is both the bid and the offer vis-à-vis retail, she has a good chance to pull out a spread between the bid and the offer; and the more customer flow she handles, the better are her chances of earning that spread.

In dealing with retail, it is important that a dealer, if she wants to see activity by big accounts, be as big as the market—be able to deal in the size her customer wants to deal in. An occasional account might ask a dealer to bid on \$250 million of long bonds—maybe only a few traders in the business could handle such a request. “When I buy \$250 million from a customer,” said one bond trader, “I have to reduce my exposure. Probably I bought those bonds in competition with two or three other dealers who know that those bonds have come into the market. So I pretty much have to get out. I bid them on an assumption about where I could get out. If I think it is down $\frac{2}{32}$, I bid them down $\frac{2}{32}$ from the bid side of the market at the time. If I think that I need to sell maybe only \$50 million or

\$100 million of them, I take that into consideration. If I buy something and do not want it, I have got to get out of all of it. I cannot half-hedge it because I am right or wrong; so, either I want to hold on to it all or to sell it all.

“Say I bought the long bond at $97\frac{1}{2}$. The Board [bond futures] is trading at $111\frac{1}{2}$. If I figure that I can sell only \$50 million bonds around $97\frac{1}{2}$ before I start to drive the bond down, I will, at the same time I start selling cash bonds, start selling the Board at $111\frac{1}{2}$. I can probably sell more of the futures than I can of the cash. Say I sell 100 bonds and 1,500 bond contracts.¹² My net position is now flat; but I am long bonds and short bond futures, so I have basis risk [risk that the relationship of cash to futures prices may move]. My goal is to be flat bonds and flat the Board. To do that, I have to sell the basis. There are many traders who will trade bond basis with our trader, all of the dealers’ long-bond traders as well as basis traders, spec accounts who play around in basis rather than in bonds.” (For an example of a basis trade, see Chapter 16.)

THE YIELD CURVE: A CRYSTAL BALL?

Investors always seem to be looking for a crystal ball to help them predict the future. In the bond market, there’s one indicator that many investors put ahead of all the rest: the yield curve. It’s the closest thing that the bond market has to a crystal ball. For decades the yield curve has reliably foreshadowed major events and turning points in both the financial markets and the economy. For these reasons, the yield curve is one of the most closely watched financial indicators.

Before we go on, let us tell you a little bit about what the yield curve is. For simplicity’s sake, assume that when we say “yield curve,” we are talking about the yield curve for U.S. Treasuries.

The yield curve is a chart that plots the yield on bonds against their maturities. The shape of the yield curve is generally upward-sloping, with yields increasing in ascending order as the maturities lengthen. In other words, a “normal” yield curve is one in which the yields on long-term maturities are higher than the yields on short-term maturities. The maturities generally included in yield curve graphs usually range from

¹² In bond-land, “100 [cash] bonds” is understood to be \$100 million face value. However, since the bond futures contract is for bonds having a \$100,000 face value, 1,500 contracts equal \$150 million face or 150 bonds.

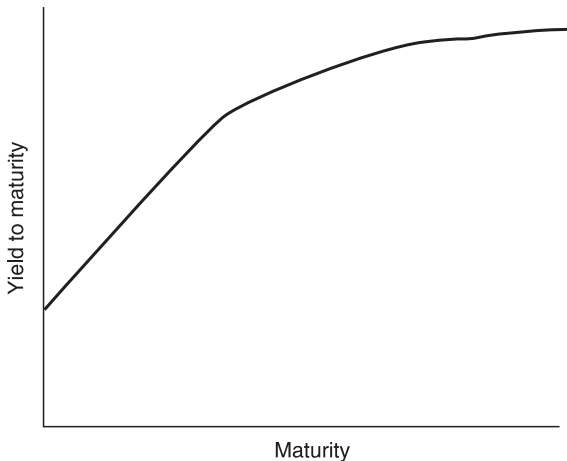
3 months to 30 years. For yield curve graphs on the Treasury market, the most commonly included securities are those that are regularly issued by the U.S. Treasury. They include 1-, 3- and 6-month Treasury bills, 2-year Treasury notes, 3-year Treasury notes, 5-year Treasury notes, 10-year Treasury notes, and 30-year Treasury bonds.

Market observers view the shape of the yield curve as a barometer of the U.S. economy, focusing on the yield spreads between various short- and long-term maturities. The two most commonly watched spreads are the spread between 3-month T-bills and 10-year T-notes and the spread between 2-year T-notes and 30-year T-bonds. Both these spreads have shown strong historical correlation to the behavior of the economy.

The shape of the yield curve can mean a variety of things to bond investors, but there are two basic ways to look at it. First, if the yield curve is “positively sloped,” or steep, this is usually seen as an indication that short-term interest rates are relatively low and are expected to remain low as a result of an accommodating stance on monetary policy by the Federal Reserve. Figure 14.7 shows a normal, or positively sloped, yield curve. In such an environment short-term interest rates are lower than long-term interest rates because the Fed’s interest-rate reductions put downward pressure on short-term interest rates, the rates the Fed controls. Long-term interest rates, however, do not fall in lockstep with the Fed’s rate cuts in

FIGURE 14.7

Normal (positively sloped) yield curve

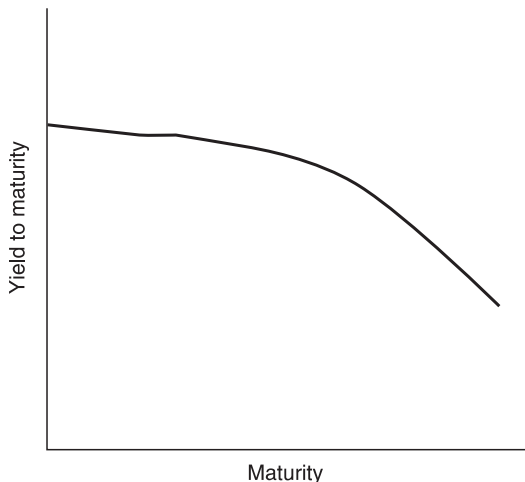


the same way that short-term interest rates do. Long-term interest rates are influenced by inflation expectations, expectations about future short-term interest rates, and many other factors. This prevents long-term interest rates from falling as much as short-term interest rates. When the Fed lowers short-term interest rates, its monetary policy is considered friendly, and this is usually good news for bonds, stocks, and the economy because it lowers the cost of borrowing. A steep yield curve therefore generally bodes good times for investors over several quarters.

By contrast, a “negatively sloped,” or inverted, yield curve usually is seen as an indication that short-term interest rates are relatively high and are expected to remain high, with the Fed engaged in a strategy to slow the economy by raising short-term interest rates. Figure 14.8 shows an inverted yield curve. In such an environment, short-term interest rates are higher than long-term interest rates because of interest rate hikes by the Fed. This, of course, generally portends a gloomier set of conditions for bonds, stocks, and the economy because it raises the cost of borrowing. In fact, since 1970 every inverted yield curve has been followed by a period in which S&P 500 earnings growth was negative and has almost always preceded either an economic slowdown or a recession.

FIGURE 14.8

Inverted (negatively sloped) yield curve



A Crystal Ball Indeed

Throughout the years, the yield curve has proved to be one of the best economic indicators among the many that exist. The yield curve is thought to be a better predictor of the economy than the stock market is, for example, and can give an investor an edge if the investor follows it. Indeed, studies have shown that the yield curve predicts economic events roughly 12 months or more in advance, while the stock market is thought to foretell events only 6 to 9 months in advance.

The yield curve is easily on sounder footing than many other well-known indicators. It's certainly better than making predictions based on the winner of the Super Bowl or by measuring hemlines. Incredibly, these indicators are cited year after year.

In various studies, the yield curve has proven to be a superior financial indicator. In a study conducted by Haubrich and Dombrosky it was found that from 1965 to 1995 the yield curve performed as well or better than seven professional forecasting services.¹³ In another study on the yield curve, conducted by Estrella and Mishkin at the Federal Reserve, it was found that the yield curve is superior to The Conference Board's index of leading economic indicators (LEI), which was formerly released by the Commerce Department. That study found that, unlike the yield curve, the LEI sent several incorrect signals in the 1982–1990 boom period.¹⁴

There are a number of reasons why the yield curve is one of the best financial indicators available. Perhaps one of the more appealing reasons relates to the Federal Reserve. Since the yield curve largely reflects actions or expected actions taken by the Fed, it contains a significant amount of information about monetary policy. This explanation of the yield curve's shape is called the *policy anticipation hypothesis*. This hypothesis states that the yield curve captures market expectations about future Fed policy. Since market expectations about the Fed tend to be accurate, the yield curve is a terrific tool for forecasting the economy. Accurate assessments of the Fed will generally lead to accurate assessments of the economy's performance, since the Fed's actions tend to have a large impact on the economy. In essence, therefore, the yield curve captures a complex intermingling of policy actions, reactions, and real effects.

¹³ Joseph G. Haubrich and Ann M. Dombrosky, "Predicting Real Growth Using the Yield Curve," Federal Reserve Bank of Cleveland, *Economic Review*, 1996.

¹⁴ Arturo Estrella and Frederic S. Mishkin, "The Yield Curve as a Predictor of U.S. Recessions," Federal Reserve Bank of New York, *Current Issues in Economics and Finance*, June 1996.

Another reason the yield curve is such a good financial indicator is that it contains a significant amount of information about the risk premium on long-term assets. The *risk premium* reflects the risks that investors assign to holding various types of assets. For example, the risk premium that investors assign to junk bonds is considerably higher than the risk premium they assign to U.S. Treasuries. In the Treasury yield curve investors do not differentiate between the credit risks of holding various maturities but they do differentiate between the risks of holding Treasuries to different maturity dates. Holding a 10-year T-note, for example, requires greater tolerance for uncertainties about inflation, economic growth, and other factors than is required when holding a 3-month bill. The yield curve therefore contains a significant amount of information on the risk premium that investors are assigning to holding long-term assets. The greater the uncertainties are, the less willing people will be to invest in long-term assets. Conversely, when people are confident about the future, they become far more willing to invest in long-term assets.

The Conundrum of Low Long-Term Rates

In a speech delivered before the New York Economic Club in March 2006, Fed Chairman Ben Bernanke offered a number of possible explanations as to why long-term interest rates had not increased much following the Fed's interest-rate hikes during the period 2004–2006. One of the more popular theories, he said, was that, “A substantial portion of the decline in distant-forward rates over recent quarters can be attributed to a drop in term premiums. Using some of these models, we can further divide the term premium into two parts—a premium for bearing real interest-rate risk and a premium for bearing inflation risk.” Bernanke said there were at least four possible explanations that had been put forth as to why the net demand for long-term issues had increased:

- Inflation expectations had become more stable, and there had been a reduction in economic volatility.
- Increased foreign buying related to increased dollar purchases by a number of governments, particularly in Asia.
- Changes in the management of and accounting for pension funds have encouraged a greater alignment of assets and liabilities.
- The supply of Treasuries hasn't kept up with demand, with global issuance lower than it has been in past years.

Probably the most compelling of the four explanations is the lowering of inflation expectations. During the rate hike episode of 1994, the yield on 10-year notes leapt almost 3 percentage points to over 8%, in part because inflation expectations were far different that year from what they would be a decade later. In 1994, the economy had sped up following several years of relatively tepid growth after the end of the 1990–1991 recession. The fear was that inflation would return as it had in past years when economic growth accelerated. In fact, the consumer price index had gone to as high as 6.3% on a year-over-year basis in October 1990, which was a relatively short time prior to the pickup that was occurring in the economy in 1993 and 1994. In other words, high levels of inflation were fresh in investors' minds. In fact, in the 10 years ending in 1995, the deflator for personal consumption expenditures averaged 3.6%, about 2 percentage points more than in the 10 years ending in 2005. Those 2 percentage points are probably a major reason why long-term rates have stayed relatively low. Mind you, the decline in inflation expectations would not likely have occurred if Federal Reserve Chairman Alan Greenspan had not been as successful as he was in lowering inflation expectations during his tenure.

In Bernanke's March 2006 speech, the chairman described the policy implications of the behavior of long-term rates as "ambiguous" because rates could reflect either a declining term premium or macroeconomic conditions. To the extent that long-term rates reflect a declining term premium, Bernanke argued that the required policy rate will be higher than usual. If the decline is caused by macroeconomic influences, the required rate will be lower.

Recent Examples of the Yield Curve's Predictive Power

There have been many occasions throughout our nation's history where the yield curve accurately foreshadowed events in the economy and the financial markets. Let's take a look at a few of them and start by looking at the events of 2000.

The yield curve's powerful predictive value was clearly illustrated in 2000 when the events of that year were forecast by the inversion of the yield curve that began in January 2000. Investors who heeded the yield curve's warnings at the start of that year sat on a pot of gold. Almost everyone else wound up looking at their stocks like a deer caught in the headlights.

The inversion that began that January was the first such inversion since the last recession back in 1990. While many investors and analysts dismissed the inversion as related to technical factors such as Uncle Sam's buyback of the national debt (which mostly entails the purchase of long-dated maturities), there were clearly other reasons for the inversion, and the bond market was sounding clear signals about the economy and the markets.

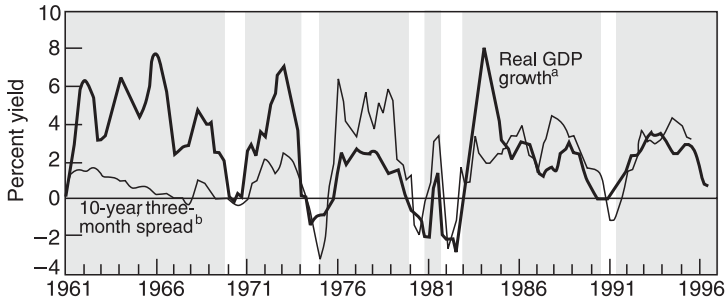
One message in the inversion was that the bond market was beginning to believe that in order to contain the rapid growth that was occurring in the economy, the Fed would have to raise short-term interest rates aggressively. That's exactly what happened; the Fed raised rates 1 full percentage point over the next four months, driving up short-term market interest rates and spurring the inversion, with short-term rates rising faster than long-term rates. The inversion signaled that bond investors believed economic growth would eventually decelerate. It did. Signs of economic weakness began to pile up by the end of 2000, and there were hints that the economy might enter into a recession in 2001, as it eventually did.

A second message contained in the inversion of the yield curve in 2000 was that stock prices might fall. They did. Stock investors didn't respond right away, but the bubble soon burst. It is probably no coincidence that the Dow Jones Industrial Average peaked the same month that the yield curve inverted. The S&P 500 and the Nasdaq weren't far behind, peaking just a couple of months later in March.

On the three prior occasions that the yield curve inverted—1989, 1982, and 1980—a recession soon followed. These episodes provide strong evidence of the powerful predictive value of the yield curve and its correlation to the economy.

Figure 14.9 shows this. The chart shows the yield spread between 10-year notes and 3-month bills compared to year-over-year growth in real GDP. It clearly shows the inversions that occurred prior to past recessions. Keep in mind that investors don't always know that a recession is under way until it is partly over. This means that even a short heads-up on a looming recession can be extremely valuable to investors.

While an inversion in and of itself is a powerful indicator of recession, the probability of recession increases with the magnitude of the yield curve's inversion. Estrella and Mishkin's study (1996) conducted for the period from 1960 to 1995 found values of the yield curve spread that correspond to estimated probabilities of recession four quarters in the future. They found that the yield curve spread between the 10-year Treasury note and the 3-month T-bill was one of the most successful models of recession

FIGURE 14.9**Real GDP growth and lagged yield spread**

^a Four-quarter percentage change.

^b Lagged four quarters.

Note: Shaded areas indicate recessions.

Sources: Board of Governors of the Federal Reserve System and U.S. Department of Commerce, Bureau of Economic Analysis

four quarters in the future. Table 14.7 shows their findings. As the table shows, an inverted spread of 2.4 percentage points implies a 90% probability of recession four quarters into the future. The main message is that the more inverted the yield curve is, the greater the probability of recession in the future.

Despite Estrella and Mishkin's findings, the bond market tends to focus on the yield spread between 10-year notes and 2-year notes rather than 10s and bills. Focusing on 10s and bills seems the better of the two spreads to watch when considering the fact that inversions to the money market curve have a far greater influence on the profit and loss dynamic for yield curve trading than do intra yield curve inversions. The reason is that, when Treasury yields fall below the fed funds rate, those who finance their long positions incur *negative carry*, or losses that reflect the difference between the financing cost (which tends to be roughly equal to the fed funds rate) and the stated yield to maturity on the security financed. Market participants generally loathe negative carry and take pains to avoid it. Treasury yields thus rarely trade below the funds rate and usually only when an interest-rate cut is on the near-term horizon. In fact, during the period 1989–2005, 10-year notes traded below the funds rate on only three occasions and only when an interest-rate cut was imminent. Similarly, the 2-year note traded below the funds rate only five times, also only when an interest-rate cut was imminent (no greater than six months away).

TABLE 14.7

Estimated recession probabilities for Probit model using the yield curve spread (four quarters ahead)

Recession Probability (%)	Value of Spread (percentage points)
5	1.21
10	0.76
15	0.46
20	0.22
25	0.02
30	-0.17
40	-0.50
50	-0.82
60	-1.13
70	-1.46
80	-1.85
90	-2.40

Note: The yield curve spread is defined as the spread between the interest rates on the 10-year Treasury note and the 3-month Treasury bill.

Source: Federal Reserve

Investors have shown that they will tolerate negative carry only when they believe that the Fed will cut interest rates soon enough to alleviate the situation. The distaste that investors have shown for negative carry is a significant element in the interpretation of the signals emanating from the yield curve. In particular, given that investors have shown that they will tolerate negative carry only when they expect a rate cut, inversions between Treasuries and the money market curve most likely indicate that investors believe the economy is slowing or will slow enough to compel the Federal Reserve to lower the funds rate. Inversions to the money market therefore carry more significance than intra yield curve inversions, which do not have the same dynamic associated with carry.

In 2005, investors put a lot of attention on the tight yield spread and eventual inversion between 10-year notes and 2-year notes, but no sign of recession was apparent well into 2006. The lack of such signs fits perfectly with the findings shown in Table 14.7; the spread between 10s and bills did not invert by enough to validate widespread market chatter about the

possible negative economic implications emanating from the spread between 10s and 2s.

The few examples shown above clearly suggest that the yield curve truly is the bond market's equivalent of a crystal ball. And it's a tool that's so simple to use that just about anyone can use it.

Why the Treasury Yield Curve?

The Treasury yield curve is by far the most closely followed yield curve. It is the first yield curve that market participants and forecasters look to for signals about the economy and the financial markets. There are two main reasons for this. First, because Treasuries are not at risk of default, the Treasury yield curve provides a "clean" look at where market participants believe interest rates should be along the various maturities. Unlike other yield curves such as the yield curve on corporate bonds, the Treasury yield curve is not distorted by differences in creditworthiness. We know, for example, that market participants view the creditworthiness of 2-year Treasury notes equal to the creditworthiness of 10-year Treasury notes. The same cannot be said for other yield curves, which generally include a mix of different securities and therefore different degrees of creditworthiness.

Second, the U.S. Treasury market is by far the most liquid segment of the bond market. Its vast liquidity ensures that Treasury yields across the Treasury yield curve accurately reflect the market's assessment of where yields should be. In other segments of the bond market, illiquidity and infrequent trading can often distort yields and therefore lead to inaccuracies in the yield curves for these segments.

Third, yields on Treasuries are far more accessible than yields on other fixed-income securities. It's far simpler, for example, to obtain the yield on a 10-year T-note than it is to obtain the yield on a 10-year corporate bond. Price information about Treasuries is far more widely disseminated. Moreover, when drawing a yield curve for securities other than Treasuries, choosing the specific security to place on the yield curve becomes a subjective decision. For example, deciding which corporate bonds to use in a yield curve on corporate bonds requires choosing between numerous different companies.

Largely for these three reasons, it's best to stick with the yield curve on Treasury securities to get the most accurate reflection of market sentiment and the most reliable signals on the outlook for both the economy and the financial markets.

Trading the Yield Curve

Traders have always understood that there is a difference between the risk that the yield curve might shift up or down and the risk that the relationship between two yields along the yield curve might change. Traders position themselves to profit from the first sort of risk and do arbitrages to profit from the second (recall Chapter 10).

One of the most important principles regarding yield curve trading is that yield curve trends tend to be long lasting. There are therefore ample opportunities to benefit for lengthy periods from a particular yield curve strategy. Yield curve trends tend to be long lasting largely because they reflect the Fed's monetary policies, which are usually in place for a while, and because they reflect the economic cycle, which also tends to last a while.

With the widespread use of duration in figuring and hedging market risk, traders tend to use duration as part of their jargon. Duration-weighted hedging is likely to leave a dealer long and short on quite different maturities. It eliminates *directional risk*: protects the dealer from a *parallel shift* in the yield curve (e.g., rates in all maturities going up or down an 01). However, a dealer who is flat from the point of view of duration-weighted hedging can have a big and risky curve trade on: she could be short at the front end of the curve and long at the back end or vice versa. If so, she has *curve risk*. A dealer can always gauge her curve risk by looking at her position sheet, which tells her exactly where she's long and short. If she doesn't like her curve risk, she can alter her positions along the curve. On the other hand, if she likes her curve risk—it's a bet she wants to make—she'll let her positions stand.

Traders whose job it is to make bets on relationships along the yield curve—that is, do arbs along the yield curve—are often referred to as *curve traders*.

In periods when market volatility is low and it's therefore tough to make a lot of money on position plays, dealers tend to do a lot of arbitrage. In the words of a curve trader, "Range markets lead the way for a little more value trading and less speculation. By value trading I mean this sort of thing: I think the 5-year note, which is being auctioned today, will come cheap; that is not to say that I am just going to buy the 5s and have a long position. It means I should buy the 5s and sell 10s or something else around it because I think that the 5s are cheap to other issues—have value relative to other issues. Speculating is just saying, 'Let's buy them.'"

Curve traders prefer to deal in active issues, but they sometimes get involved in off-the-runs. Because these issues are less liquid, it may take longer for them to get back into line; also, it will take a curve trader longer to get into and out of off-the-runs.

Sometimes, a curve trader will have two separate accounts. In one, she day trades, eliminating the need to finance positions overnight. In the second, which is a desk proprietary account, she puts on trades for a longer term. When she trades the second account, she has to borrow securities for term to cover her short, and therefore she has to take more interest in conditions in the finance market. She certainly does not want to short something that's on special because it would be costly to do so.

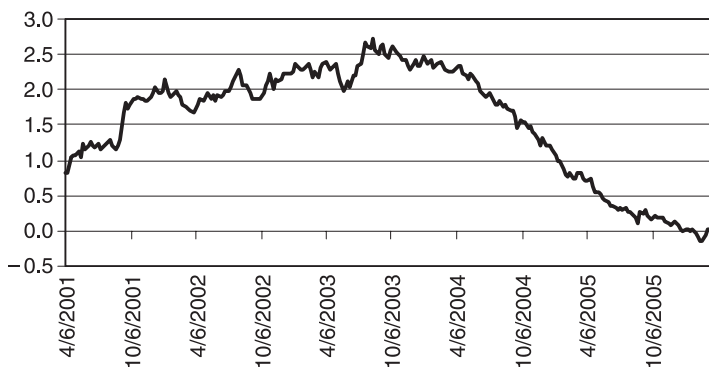
Using Technical Analysis

Most curve traders track some sort of historical data on the yield curve. Figure 14.10 shows the daily spread between the 2s and the 10s during the five years ending March 2006. Traders make judgments about the attractiveness of various strategies in part from the charts.

One interesting observation about Figure 14.10 is that having a perspective on spreads is entirely different from having a perspective on where the market is going. That spreads are declining tells you, for example, nothing about how the level of the yield curve is changing.

FIGURE 14.10

Yield spread between 10-year T-note and 2-year T-note
(in percentage points)



Source: Federal Reserve

To traders, charts such as the one in Figure 14.10 can be a helpful tool, but in the final analysis, fundamental factors are likely to be the far more dominant influences. Where the charts help, however, is the way in which they can help to support a fundamental idea or to tell a trader when to enter or exit a trade.

When markets and spreads are not highly volatile, the best way for a curve trader to make money is to do the extremes, provided, of course, that she has a strong opinion on how the shape of the yield curve is likely to change. Commented one curve trader, “You do something like the 2s/bonds [the 2-year note versus the long bond], which is a nice volatile spread. I put on a trade—sold \$58 million 2s and bought \$10 million bonds, which is roughly the equivalent [measured in yield values of $1/32$]. I put on the trade at a spread of 53. The long bond outperformed the 2s significantly—by 43 bp. So I was able to take the trade off at a spread of 10; and I made 43 bp, which is about 120 32nds on \$10 million long bonds or \$430,000.” The profit calculation could just as well have been made in terms of the 2s instead of the bond; 43 bp on \$58 million 2s also works out to a profit of \$430,000.

Actually, our curve trader does not care whether she made or lost money on her position in the 2s; ditto her position in the bond. Her bet was that the yield curve would flatten, not that it would move up or down. In fact, the yield curve over the period flattened and rose, so our trader lost some money being short 2s and made more than \$430,000 being long bonds.

One can see in Figure 14.10 the flattening and then inverting of the yield curve. In particular, when the 2-year–30-year spread reached zero, this meant that the yield curve was flat over the 2- to 30-year range; when the same spread went *negative*, this meant that the yield curve had *inverted*.

Treasury Inflation-Protected Securities (TIPS)

In January 1997, the Treasury began issuing bonds that provided investors with protection against inflation. These bonds are commonly known as *TIPS*, or *Treasury inflation-protected securities*. They are also known as *inflation-indexed*, or *inflation-linked, bonds*. There were \$395 billion of TIPS outstanding at the end of September 2006. TIPS provide protection against inflation by indexing interest and principal payments to the inflation rate. Thus, the cash flows on TIPS increase along with the inflation rate. With TIPS, an investor is protected against inflation risk, one of the biggest risks facing bond investors.

TIPS are indexed to the consumer price index for all urban consumers (CPI-U), a monthly index released by the Bureau of Labor Statistics with its widely followed CPI statistics. As the CPI-U increases, the face value of TIPS increases. For example, if you were to purchase an inflation-indexed security on its issuance date at a face value of \$1,000 and the CPI-U were to increase by 3.0% over the subsequent year, the face value of that security would increase to \$1,030. Assuming the security paid a coupon rate of 3% (it stays fixed throughout the life of the bond), your interest income would rise from \$30 per year ($\$1,000 \times 3\%$), to \$30.90 ($\$1,030 \times 3\%$). Each year, the face value would increase along with the inflation rate, thereby resulting in an increase in coupon payments. At maturity, the security would be redeemed at the inflation-adjusted face value or the face value at issuance, whichever is greater. This ensures that, even if the CPI-U declines as a result of deflation, the maturity value of inflation-indexed bonds on their maturity date will be no less than the initial face value.

It's important to keep in mind that, at any point before the maturity date on an inflation-indexed bond, the inflation-adjusted principal value of the bond could fall below its initial face value. This should not concern investors who plan to hold TIPS until their maturity date because the Treasury would implement its "minimum guarantee," which is that if deflation persisted for long enough, the Treasury will never repay less than the bond's initial face value (\$1,000).

Inflation-indexed bonds have a distinct advantage over conventional Treasuries because of their indexation to the inflation rate. The principal value of conventional Treasuries, on the other hand, will not change; it will stay at \$1,000 throughout the life of the bond. Figure 14.11 provides an illustration of the differing cash flows that the two types of bonds would experience over a 10-year horizon. Note that even though the inflation-indexed bond receives a smaller interest payment during the 10 years, the purchasing power of the money received at maturity is superior for the inflation-indexed bond.

When evaluating whether to purchase an inflation-indexed bond, one of the first things investors look at is the so-called break-even rate. The *break-even rate* can be defined as the inflation rate that would make the rate of return on a purchase of an inflation-indexed Treasury equal to the rate of return on a conventional Treasury if the two securities had the same maturity date and both were held to maturity. An inflation rate higher than the break-even rate would make the purchase of TIPS superior in terms of

FIGURE 14.11

Example of payments on nominal and indexed bonds

Consider a 10-year conventional nominal bond and a 10-year inflation-indexed bond. Each bond is purchased at its face, or principal, value of \$1,000. Although Treasury notes and bonds provide semiannual payments, the bonds in this example are assumed to provide annual coupon payments. Each coupon payment on a conventional bond is the coupon rate stated on the bond times the principal. Each coupon payment on an indexed bond is the coupon rate times the indexed principal. The indexed principal is simply the beginning principal of \$1,000 scaled up through time at the rate of inflation. We'll assume that the coupon rate on the indexed bond is 3% and that actual inflation over the 10-year horizon turns out to be a steady 2%, equal to expected inflation, and that the coupon rate on the conventional bond is 5.06% so that its expected real rate of return equals the coupon rate on the indexed bond.

A schedule of nominal and real values of payments on the bonds is given below. The real values give the purchasing power of the nominal payments. For example, suppose a given item today cost \$1. With 2% inflation, at the end of the year the same item will cost \$1.02, and \$1 will purchase .98 (1/1.02) units of the item. So, \$50.60 received at the end of year 1 from the nominal bond will purchase 49.61 units.

As the schedule of payments shows, the nominal value of the conventional bond's principal stays fixed. The real value is eroding through time because of inflation. When received at maturity, the \$1,000 principal can purchase 820.35 units of the good. In contrast, when the bond was first purchased, that \$1,000 could buy 1,000 units. The payment schedule also shows how the fixed nominal payment of \$50.60 per year on the nominal bond has a smaller real value over time because of inflation. Note that for the indexed bond, the real values of the principal and interest payments are preserved for the life of the bond. The nominal principal gets scaled up year by year according to inflation. As the principal gets scaled up, so too does the nominal coupon payment to preserve the real return of 3%. The indexed bond pays less interest than the nominal bond each year, but that is offset by its larger payment of principal at maturity.

Schedule of Payments

Conventional Bond					Indexed Bond			
Year	Nominal Value of Principal	Real Value of Principal	Nominal Interest Payment	Real Value of Interest Payment	Nominal Value of Principal	Real Value of Principal	Nominal Interest Payment	Real Value
1	\$1,000	980.39	\$50.60	49.61	\$1,020.00	1,000	\$30.60	30
2	\$1,000	961.17	\$50.60	48.64	\$1,040.40	1,000	\$31.21	30
3	\$1,000	942.32	\$50.60	47.68	\$1,061.21	1,000	\$31.84	30
4	\$1,000	923.85	\$50.60	46.75	\$1,082.43	1,000	\$32.47	30
5	\$1,000	905.73	\$50.60	45.83	\$1,104.08	1,000	\$33.12	30
6	\$1,000	887.97	\$50.60	44.93	\$1,126.16	1,000	\$33.78	30
7	\$1,000	870.56	\$50.60	44.05	\$1,148.69	1,000	\$34.46	30
8	\$1,000	853.49	\$50.60	43.19	\$1,171.66	1,000	\$35.15	30
9	\$1,000	836.75	\$50.60	42.34	\$1,195.09	1,000	\$35.85	30
10	\$1,000	820.35	\$50.60	41.51	\$1,218.99	1,000	\$36.60	30
Total nominal receipts: \$1,506					Total nominal receipts: \$1,554.07			
Real value of principal at maturity: \$820.35					Real value of indexed principal at maturity: \$1,000			

Source: Federal Reserve

its rate of return compared to that of a conventional Treasury. Similarly, if the inflation rate were to average less than the break-even rate until the bonds matured, the rate of return on TIPS would be less than it would be on conventional Treasuries.

This may seem a bit tricky to understand, but it is actually quite simple. A key principle in the analysis is that the yield to maturity on most conventional bonds consists of three main components:

- A real rate of return
- Compensation for inflation
- Compensation for credit risk

On a conventional Treasury, the yield consists of just the first two components, since Treasuries are considered free of the risk of default. This helps to make the analysis even simpler. Working on this premise, since the yield on a conventional Treasury consists of both a real rate of return and compensation for inflation, we need simply determine one or the other to find both. This is where TIPS come in. TIPS can help us find both variables because its yield to maturity also consists of a real rate of return plus compensation for inflation. In fact, on an inflation-indexed bond, its stated yield to maturity is its real rate of return. (The actual yield to maturity can't be known up front because it depends on the inflation rate.) The key here is that, unlike conventional Treasuries, an investor knows what the real rate of return is. The rest of the return consists of an unknown inflation rate. Investors, analysts, and policy makers use this real rate of return to find the inflation expectations embedded in the conventional Treasury. With the real rate of return in hand, we simply subtract it from the nominal or stated yield to maturity on the conventional Treasury. The difference represents the market's inflation expectations over the life of the bond. How do we know this? Well, there's simply no reason to think that investors in TIPS have different inflation views from investors in conventional Treasuries, and since both have nearly equal real rates of return, the difference between their nominal or stated yields must be the market's inflation expectations.

There are caveats to this analysis, however, as the yield differences may reflect more than just the market's inflation expectations. For example, despite the increase in the amount of TIPS outstanding, TIPS are notoriously illiquid compared to conventional Treasuries. Thus, during periods when investors express preferences for liquid securities, the yield on TIPS might be artificially high to compensate for their relative illiquidity.

This narrows the break-even rate. Second, TIPS are subject to a so-called indexation lag. That is, since the principal value of an inflation-indexed bond is based on an inflation rate set as much as three months prior to the semiannual coupon payment, there's a risk that the holder of an inflation-indexed bond will not be fully compensated for the actual inflation of the prior three months. For example, if an investor were to buy an inflation-indexed bond in July, the interest payment that she receives from July through October will be based upon the semiannual adjustment made to the price of the bond in October based on the CPI-U from January through June. Therein is the risk. From July through October, the investor will be paid interest based on an inflation rate in the past (January through June). If inflation were to gain sharply in those three months, the October interest payment would not reflect the inflation rise. A third reason to be careful about a strict interpretation of the amount of inflation expectations derived using TIPS is the differences in the tax implications on the cash flows. Because a TIPS investor is compensated for inflation, when inflation accelerates, so do the cash flows on the bonds. In turn, so does the tax liability. Therefore, the TIPS investor is not fully insulated from the effects of inflation. Hein and Mercer counter this argument, however, saying that in an after-tax valuation approach, TIPS generally have after-tax yields comparable to, if not exceeding, conventional fixed-rate Treasury securities.¹⁵ Fourth, investors in TIPS may be naturally more averse to inflation risks than investors in conventional Treasuries. This means that they may be more willing to accept a lower real rate of return. Therefore, the difference between yields on TIPS and conventional Treasuries may overstate the market's true inflation expectations.

ZERO-COUPON BONDS

Zero-coupon securities (note and bond issues carrying a zero coupon) represent a relatively small portion of the Treasury market, with \$183 billion outstanding in early 2006, down from a peak of about \$230 billion in 1998. Nevertheless, there is a ready market for zeros in both the United States and abroad. A big attraction of zeros to buyers is that they provide a guaranteed reinvestment rate over the life of the bond. For investors, this

¹⁵ Scott Hein and Jeffrey Mercer, "Are TIPS Really Tax Disadvantaged?: Rethinking the Tax Treatment of U.S. Treasury Inflation Indexed Securities," Federal Reserve Bank of Atlanta, Working Paper, July 2003.

guarantee significantly reduces uncertainty over what total return a bond will yield over its life. The offset to this advantage in the United States is that taxable investors must pay taxes on interest that accrues to them on zeros as that interest accrues whereas they actually get interest years later when the bond matures. Consequently, in the United States zeros are most attractive to tax-exempt or low-taxed investors: pension funds and individuals investing their retirement monies in IRAs and other types of retirement accounts. They are also seen as attractive to investors seeking capital gains, given that the duration on a zero-coupon bond is longer than on coupon securities with the same maturity date (the duration on a zero-coupon bond is always equal to its length to maturity). Zero-coupon bonds are also attractive to savers and investors wishing to have a known cash flow at a specific date in the future.

THE ZOO

Beating the U.S. Treasury to the punch, in August of 1982, Merrill, counting on the idea that Treasuries packaged as zeros could lure into long-term government bonds many investors who would not otherwise buy them, came up with an idea of how to do this packaging: buy long bonds, put them into a bank, and issue receipts against all coupon payments and the principal repayment that the Treasury is scheduled to make. Packaging a Treasury long bond this way creates a series of zero-coupon Treasuries, one maturing on every coupon date, including the final principal repayment date.

Merrill sold its Treasury investment growth receipts (*TIGRs*, pronounced tigers) at the present values of the principal amount the investor would get. Since zero coupons appealed more to long-term investors than to short-term investors, in pricing its TIGRs, Merrill, to attract shorter-term investors, offered investors buying short TIGRs a guaranteed yield to maturity slightly above the yield to maturity offered by regular Treasuries of similar maturity; on long TIGRs Merrill offered a guaranteed yield to maturity below rates on the yield curve.

On its first venture into coupon stripping, Merrill bought, cut up, and banked half a billion of the 14s of 2011; it then sold, on the basis of these securities, \$2.565 billion of TIGRs. That venture—viewed with considerable trepidation by some executives at the firm—was such a success that Merrill followed it up with a new TIGR issue: \$1.39 billion of TIGRs backed by \$300 million of the 12¾s of 2010.

While Merrill was the first to wave its wand over interest-bearing Treasuries and create zero-coupon bonds from them, Merrill's TIGRs were soon followed by Sali's CATS (certificates of accrual on Treasury securities) and Lehman Brothers' LIONs (investment opportunity notes). Over \$50 billion of zero-coupon securities were created by the various investment banks between 1982 and 1984 before the Treasury Department introduced a zero-coupon security program of its own in January 1985. From that point on, the market for CATS, TIGRs, LIONs, and all the rest began to shrink.

STRIPS

The zoo that grew on Wall Street did not go unobserved by the Treasury. It decided to preempt for itself the profits earned plus the high expenses incurred by the dealers in creating proprietary zeros. To do so, the Treasury declared in late 1984 that henceforth any 10-year note or any 20- or 30-year bond that it issued could be stripped via the book-entry system.¹⁶ To make this possible, the Treasury gave a separate CUSIP number to the corpus (principal) of each bond or note that could be stripped and a separate CUSIP number to each date on which coupon payments on such securities were to be made. The Treasury dubbed its new do-it-yourself zeros *STRIPS* (for *separate trading of registered interest and principal securities*). The long bond issued in the November 1984 refunding was the first bond to be strippable under the new Treasury program; it was also the last callable issue offered by the Treasury.

STRIPS have a lot of appeal to a wide array of investors. They are a pure product about which an investor needn't do a lot of thinking. She knows that, if she invests X dollars today, she will get Y dollars at the end of some known time, T . That's certain, and there's no reinvestment risk to worry about. However, an investor buying zeros should be aware that a zero coupon displays much greater price volatility than does a coupon security having the same current maturity (recall Chapter 5). This feature of zeros is unlikely to disturb the hold-until-maturity investor, and it may well entice the speculative investor who'll get a lot of bang for her buck playing with long zeros.

¹⁶ The Treasury used to issue a 20-year bond. It stopped doing so because it decided that 20-year bonds appealed to no natural class of investors and that it therefore had to pay up to buy 20-year money.

Zeros have been used for all sorts of things: auto dealers have offered zeros as an incentive to buyers of new cars; state lotteries have used zeros to defease payoffs to winners, which is to say that they have bought zeros that mature when payoffs are scheduled to be made; Latin American countries have used zeros to defease their existing debt; and owners of baseball teams have used zeros to fund multiyear, multimillion-dollar player contracts.

On a more pedestrian level, zeros appeal to mom and pop as a good investment for IRAs, retirement accounts, and for funding junior's college tuition. The big demand for zeros from consumers tends to be in the 13- to 20-year maturities.

There is also a large institutional demand for zeros from pension funds (which match the payment flows of their assets with those of their liabilities to make benefit payments), insurance companies, and other big investors wanting long duration and certain return. Such investors are often looking for zeros with a long duration of at least 15 to 20 years.

Stripping and STRIPS Outstanding

Since the Treasury started permitting stripping, dealers—in response to investor demand—have been stripping fairly large amounts of bonds, although the Treasury's decision to stop selling 30-year bonds in 2001 resulted in a decrease in the amount of STRIPS outstanding. Nevertheless, there remains a large market for STRIPS, most of which is concentrated in bonds. Indeed, of the \$183 billion of STRIPS outstanding at the end of February 2006, \$151 billion were created from bonds, representing 31% of all Treasury bonds outstanding. For notes, there were only \$32 billion outstanding as of the same date, only 1.4% of the total amount of Treasury notes outstanding. The tally for Treasury inflation-protected securities (TIPS) held in stripped form was far smaller, at just \$278 million, which was less than 1% of the total amount of TIPS outstanding.

The main reason why bonds are stripped much more than notes relates largely to the fact that stripped bonds provide investors with securities that have longer duration than conventional Treasury bonds; they can have durations as much as twice as long, or more, than conventional Treasury bonds. This is appealing to a variety of investors, many of whom are mentioned earlier. Another reason why bonds are stripped more than notes is that stripped bonds create a large swath of STRIPS related to the coupon payments associated with the bonds. For example, a Treasury

bond with 25 years remaining until maturity consists of a single principal payment at maturity and 50 interest payments (2% for 25 years). When this bond is converted to STRIPS form, each of the 50 interest payments becomes a separate security plus the principal payment. Coupon STRIPS are *fungible*, which is to say that all coupon STRIPS have the same CUSIP number (with the exception of those for TIPS, although there is an adjustment that can be made to make the stripped interest component of a TIPS interchangeable with the interest components of other TIPS with the same payment date). The stripping of longer-dated Treasuries therefore creates an ample supply of short-dated interest STRIPS with characteristics that would be no different if they were stripped from short-dated Treasuries. Treasury bonds pay coupon interest on the 15th of the month in February, May, August, and November. So the total number of STRIPS that can be outstanding is 4 times 30 coupons plus corpus for every strippable bond.

In the land of STRIPS, a distinction is made between STRIPS that correspond to *principal (corpus)* and those that correspond to *coupons*. One reason the Treasury made this distinction initially was to appeal to Japanese investors who, prior to a change in their tax laws, were not taxed on income from a zero corpus until it matured.

Arb Opportunities with STRIPS

Whether a dealer can make money stripping a given bond depends on the relationship between the market value of that bond and the market value of the sum of its parts. Every dealer has a program geared to make this calculation. The arbitrage is obvious: if the value of the bond is less than the value of the sum of its parts, then strip. Also, the reverse is true: if the value of the bond is more than the value of the sum of its parts, then *reconstitute* the bond. The arb works both ways.

Since the arb is so obvious, there is rarely money to be made either in stripping or in reconstituting bonds. In a study, Sack found that the arbitrage opportunities between coupon-bearing Treasury securities and the reconstitutable portfolio of STRIPS is limited and that most of the price differences likely fall within the range of transaction costs. The study found that, under the typical transaction cost (a bid-offer spread of about $\frac{2}{32}$ of a point), only about 15% of the study's 57,084 observations presented a stripping arbitrage opportunity. The actual profit potential may be smaller than that because the actual transaction costs could be greater than is apparent. This results from slight differences in the taxation of these

instruments, although this seems to have a trivial effect. The coupon interest of conventional Treasury securities is taxed, along with a portion of the anticipated capital gains or losses on the security. Since STRIPS pay no coupons, STRIPS are taxed as original-issue discount securities under which the gains in the price of the security are amortized assuming a constant yield to maturity. This difference makes it more advantageous to hold STRIPS as yields rise and as the yield curve steepens.¹⁷

How Treasuries Are Stripped

Often, the stimulus to strip or reconstitute is a big request from retail. “What really happens,” noted one trader, “is that you have a customer who wants to buy the corpus of, say, the 09 bond and another customer who wants to buy part of the strip of coupons. So you tell your sales force, ‘If you get rid of these and those coupons, then we can work this order: buy this bond; strip it; and sell this piece to one guy, that piece to another guy, and so on.’ Or it could work the reverse: somebody wants to sell me all of these coupons relatively cheap, so if I could just go and get this corpus and this and that coupon, I could reconstitute the bond cheaper than the market is.”

The tax laws are such that, for most investors in STRIPS, it makes no difference whether they own corpus (principal) or coupons, so it seems pointless to continue to distinguish between the two. However, doing so does prevent dealers from, say, reconstituting a 10-year bond from bits and pieces of 20- and 30-year bonds that have been stripped. Thus, the Treasury need not fear that stripping and reconstituting will change the structure of its outstanding debt. Also, coupon and principal STRIPS trade differently because STRIPS corresponding to principal are much bigger and thus have more appeal to institutional investors.

One effect of stripping is to reduce the liquidity of the long bond. “What you have seen,” noted a dealer, “is that the long bond is no longer the trading vehicle it was years ago. I think that now the 10-year is becoming the major trading vehicle. On Wall Street, your best government trader used to be the 30-year trader; he is now more often the 10-year trader. We traders of zeros have become by default the long-bond traders. We dictate how rich or cheap it gets. We buy bonds when they are too cheap and take them apart; and when they get too rich, we buy zeros, reconstitute them, and sell long bonds.”

¹⁷ Brian Sack, “Using Treasury STRIPS to Measure the Yield Curve,” *Finance and Economics Discussion Series*, Federal Reserve Board of Governors, October 2000.

The process by which Treasury securities are stripped or reconstituted is simple and inexpensive. The process is initiated by a depository institution such as a financial institution, a government securities broker, or a government securities dealer, which sends a request via Fedwire to the Federal Reserve Bank of New York requesting that a security be stripped. The Fed then converts the security into stripped form and credits the holder's account. The process takes about 30 minutes and costs just \$25 (Sack, 2000). To reconstitute a stripped security, a financial institution or government securities broker or dealer must obtain the appropriate principal component and all interest components that have not yet matured.

The minimum face value needed for a Treasury security to be eligible to be stripped is just \$1,000. All amounts above \$1,000 must be in multiples of \$1,000. For TIPS, the same rules apply.

The STRIPS Market

A wire house like Merrill sees a lot of demand from consumers and institutions, whereas a shop like Goldman sees mostly institutional demand.

Normally, STRIPS are quoted in terms of yield. STRIPS are brokered by the major brokers of Treasuries. In the brokers' market for STRIPS, \$1 million is a round lot, and the usual spread between the bid and the offer varies depending upon the length to maturity. Shorter maturities might have a bid-ask spread of 1–3 basis points and on longer maturities the bid-ask could be as wide as 4 basis points. Trading flows between STRIPS and conventional Treasuries are significant enough to maintain tight relationships between the valuations of these securities.

When a security is stripped, it trades at a deep discount to its face value. Its price will rise over time to reflect the cash flow that the security represents. The difference between the purchase price of STRIPS and their face value represents the investor's investment return.

A dealer who is big in STRIPS will have a desk of traders—maybe a trader for short STRIPS, a trader for long STRIPS, and maybe a couple of traders for agency paper that has been stripped and agency bullet issues, which are discussed below.

Trading STRIPS

The spread movements in zeros are very sensitive to changes in the shape of the yield curve. "So we do," observed a zeros trader, "a fair amount of

arbitrage both for ourselves and as we buy from and sell to customers. If I sell something to a customer, I am unlikely to be buying back that exact issue in the next 10 minutes. So I have to buy something else back against it. I try to sell what I think is expensive and buy back what I think is cheap. That entails setting up some sort of arb; it can be just a spread arb within a sector—meaning, if I sell Feb 19s, maybe I buy May 19s and try to swap them with a different customer; it can also mean a yield curve trade: I sell Feb 21s and buy 30-year bonds. A 15-year zero and a 30-year bond have about the same duration. I am trying to match durations at all times—to take directional risk out of my position but still have a spread trade on.”

Another trader of zeros noted that, since zeros range all over the lot in maturity, he might, to hedge positions in zeros, use an offsetting position in similar zeros, use the long-bond contract against 15- to 30-year stuff, and maybe use the old 3-year, the old 5-year, and the old 10-year against shorter paper. One feature that makes trading zeros difficult is that the reverse and bonds-borrowed market is small by the standards of the Treasury coupon market. “The repo market in zeros isn’t,” noted one trader, “like the repo market in Treasuries. Outstandings of individual maturities in zeros are a lot smaller, so it is common to find issues [of zeros] that you cannot borrow or that trade at very tight repo spreads.”

Barriers to Treasury Issuance of Zeros

Some people, looking at the STRIPS yield curve, might ask, “Why shouldn’t the Treasury issue 30-year zeros? That’s the most expensive [lowest cost to the Treasury] paper it can sell.” There are several good reasons why not. First, in the spring of 2006, 30-year zeros were trading at around 26 cents to the dollar. Thus, to raise—by selling STRIPS—the kind of money it gets from selling 30-year coupons, the Treasury would have to issue securities having a face value four times bigger, and that would bump the Treasury right up against the statutory debt ceiling, which is often used as a political football in Washington. For example, there was much wrangling over the debt ceiling in March 2006 before the Senate squeezed through a much needed increase in the debt ceiling by a 52-48 vote, which went along party lines despite the urgency of the matter (the Treasury had delayed its weekly auction of 3- and 6-month bills because the sale would have put the nation’s debt levels above the authorized debt ceiling). Also, Congress and many others would surely oppose having the Treasury issue 30-year debt that would have *no* cost to any administration in the near future.

FEDERAL AGENCY SECURITIES

There are two main types of federal agency securities: government-sponsored enterprises (GSEs), and federally related institutions. Most agency securities are issued by the housing-related GSEs; federally related institutions only rarely issue debt on their own and instead obtain funding from the Federal Financing Bank, which was created in 1973 to help meet the funding needs of a variety of U.S. agencies such as the General Services Administration, the Farmers Housing Administration, and the Export-Import Bank.

Government-Sponsored Enterprises

Government-sponsored enterprises are publicly chartered, privately owned companies that were created by Congress to provide funding to important sectors of the economy including housing, farming, and education. GSEs issue debt to raise capital to lend to prospective borrowers, particularly in the housing market. The GSE market has grown rapidly in recent years, owing mostly to a surge in debt issued by agencies that provide funding for the housing sector. At the end of 2005, the GSEs had \$2.575 trillion of debt outstanding, an increase of 20% compared to four years earlier.

There are nine government-sponsored enterprises:

1. Federal Farm Credit Bank System
2. Farm Credit Financial Assistance Corporation
3. Farm Credit System
4. Federal Home Loan Bank
5. Federal Home Loan Mortgage Corporation (Freddie Mac)
6. Federal National Mortgage Association (Fannie Mae)
7. Student Loan Marketing Association (Sallie Mae)
8. Financing Corporation
9. Resolution Trust Corporation

Of the nine, the two largest individual entities are Fannie Mae and Freddie Mac, both of which supply funding to borrowers in the housing market. The Federal Home Loan Bank (FHLB) is the third GSE geared to facilitating activity in the housing market. Although Fannie and Freddie are the largest individual entities, neither had more debt outstanding than the Federal Home Loan Bank, whose debt includes the debts of the 12 regional

Federal Home Loan Banks. Combined, data from the Bond Market Association show that these three GSEs accounted for about 95% of the total amount of federal agency debt outstanding at the end of 2005. Let's take a look at how these three entities perform their vital function.

Fannie and Freddie: The Housing Market's Best Friends

In 1938 the federal government established the *Federal National Mortgage Association (Fannie Mae)* to help counter the funding problems prospective home buyers faced during the Great Depression. Fannie Mae remained a *government agency* until 1968 when it was divided into a private company (as we know it today) and the Government National Mortgage Association (Ginnie Mae), an institution that remains a government agency to this day. Note that there is a distinction between a government-sponsored agency and a government agency—a GSE is federally chartered, and securities issued by GSEs are not backed by the full faith and credit of the U.S. government, whereas debt issued by agencies such as Ginnie Mae is. Freddie Mac was chartered in 1970. Both Fannie and Freddie are regulated by the Office of Federal Housing Enterprise Oversight (OFHEO) for safety and soundness, and by the Department of Housing and Urban Development (HUD) for their commitments to their missions.

Fannie Mae In its own words, Fannie Mae states on its Web site that its current mission is “to provide financial products and services that make it possible for low-, moderate, and middle-income families to buy homes of their own.” Indeed, since 1968, Fannie Mae has helped more than 63 million families purchase their own homes. Fannie Mae accomplishes this mission by lending indirectly rather than directly to prospective home buyers. This means that Fannie Mae operates in the secondary market for home mortgages rather than in the primary market. In other words, instead of lending directly to prospective home buyers, Fannie Mae purchases mortgage loans from mortgage lenders such as savings and loan institutions, mortgage companies, and commercial banks. By purchasing existing mortgages, Fannie Mae enables these institutions to lend to a greater number of borrowers by replenishing the money that they use for mortgage lending. To finance its mortgage purchases, Fannie Mae issues debt securities in a variety of maturities. In fact, Fannie Mae is one of the biggest issuers of debt securities in the world, and it regularly issues

bills, notes, and bonds. The majority of Fannie Mae's short-term funding needs are met through its *discount notes* and *benchmark bills* programs.

Fannie Mae's discount notes are unsecured general obligations issued in book-entry form through the 12 Federal Reserve Banks. Discount notes have maturities ranging from overnight to 360 days from the date of issuance and are offered each business day through a selling group of securities dealers and brokers (more on this later). Agencies such as Fannie Mae use funds raised through the sale of discount notes to provide bridge financing to a date when they intend to issue longer-term securities. Fannie's discount notes are available in minimum amounts of \$1,000 and increments of \$1,000 on a cash-, regular-, or skip-day settlement basis.

Through Fannie's *Noncallable Benchmark Securities Program*, Fannie sells large-sized, regularly scheduled issues that seek to emulate many of the characteristics that draw investors to U.S. Treasuries, primarily by establishing a full yield curve of liquid noncallable benchmark notes. Under this program, Fannie publishes an issuance calendar containing the announcement dates for the issues that it expects to sell. The issues are brought to the market using a traditional underwriting syndicate that has a defined group of benchmark securities dealers. The dealers provide feedback on potential demand and pricing levels that help Fannie to determine the size of its upcoming offerings. For each offering, there are usually three co-lead managers with the rest acting as either co-managers or part of a designated *selling group* of about 12 members. Fannie usually launches its securities sales a day before they are priced. Securities are sold with maturities of 2, 3, 5, and 10 years. The securities are available in minimum increments of \$2,000 and in subsequent increments of \$1,000.

Fannie's benchmark bills program consists of sales of 3- and 6-month maturities on a set weekly auction schedule, and monthly sales of 1-year securities. While benchmark bills are a component of the regular discount notes program, they are unlike discount notes in that they are issued via a Dutch-auction process using Web-based technology. As with discount notes, the benchmark bills program is conducted via securities dealers, and auction bids are obtained via the Internet. Bids may be competitive or noncompetitive, with noncompetitive bids allowed up to a maximum of 20 percent of a transaction.

Fannie offers foreign currency discount notes in the euro money market. These are called FX discount notes. The program enables investors to hold short-term investments in the currency of their choosing. Trades are executed at the posted sub-Eurodollar/LIBOR spread, and dealers that

execute the trades are responsible for transacting the foreign exchange components of the trades, ensuring that Fannie Mae does not have foreign exchange exposures.

Fannie Mae's securities tend to yield only slightly more than Treasuries, although the yield spread varies depending upon the health of the economy, investors' risk preferences, and so forth. In the three years ending April 2006, the average yield spread between Fannie Mae's 10-year note and 10-year Treasuries was 40 basis points, although this spread was as wide as 140 basis points not long before in 2000. To many investors, Fannie Mae's securities offer an attractive yield spread, but those investors who are subject to taxation should be mindful of the fact that the interest on Fannie Mae's (as well as the other GSE's) debt is subject to state taxes whereas Treasuries are not (for most individuals).

In 2005, Fannie Mae's long-term debt issuance was \$155 billion compared to \$252.2 billion in 2004 and \$347.8 billion in 2003, reflecting reduced mortgage originations and adjustments to new portfolio strategies, according to the Bond Market Association. At the end of 2005, Fannie Mae had \$756.3 billion in debt outstanding.

Freddie Mac For its part, the *Federal Home Loan Mortgage Corporation (Freddie Mac)* operates very much in the same way as Fannie Mae. Since Congress chartered it in 1970, Freddie Mac's stated mission has been "to provide liquidity, stability and affordability to the housing market." As with Fannie Mae, Freddie Mac purchases mortgages from lenders and packages them into securities that are sold to investors and in doing so ultimately provide homeowners and renters with lower housing costs and better access to home financing. As with Fannie Mae, Freddie Mac purchases loans from mortgage lenders, financing its purchases by issuing debt securities of various maturities.

Most of Freddie Mac's recent short-term funding has been done through its sales of *reference bills* and *discount notes*, both of which are sold at a discount to par. In fact, most of Freddie Mac's short-term debt is sold at a discount. Reference bills are sold on a regular, standardized issuance cycle, with maturities ranging from 1 to 12 months. Auctions take place weekly, although the 12-month bill is sold monthly.

The reference bill program is a supplement to Freddie's *discount notes* program, and securities are issued at a discount to par. Maturities range from overnight to one year and can be purchased in denominations as small as \$1,000 and in additional increments of \$1,000. Discount note

offerings are posted 24 hours in advance of the sale of securities through Freddie's dealer selling group.

Freddie Mac sells a large amount of medium-term notes, most of which have embedded call options that help Freddie to manage the duration, convexity, and volatility risk of its very large mortgage portfolio. *MTN callables* are generally issued through a reverse inquiry process in which investors and underwriters customize the structure to their needs for yield, size, and so forth. MTNs represented the largest portion of Freddie Mac's debt outstanding in the early part of 2006.

Freddie's *reference notes* program is similar to Fannie's noncallable benchmark securities program in that it offers a regular issuance calendar of highly liquid issues across the yield curve, including 2-, 3-, 5-, and 10-year maturities.

At the end of February 2006, Freddie Mac had a total of \$776.6 billion of debt outstanding, consisting of \$175.2 billion of reference bills and discount notes; \$357.3 billion of MTNs; \$238.2 billion of reference notes; and \$5.9 billion in subordinated debt. Freddie issued a total of \$999 billion of debt in 2005.

Yield spreads between Freddie Mac's securities and U.S. Treasuries tend to be very close to those seen on Fannie Mae's debt, with differences mostly related to issue size and other technical factors.

The Federal Home Loan Bank System

The *Federal Home Loan Bank System (FHLB)* was established in 1932 during the Great Depression to help provide funding for home purchases. The FHLB describes its current purpose on its Web site as follows:

The mission of the Federal Home Loan Banks is to provide cost-effective funding to members for use in housing, community, and economic development; to provide regional affordable housing programs, which create housing opportunities for low- and moderate-income families; to support housing finance through advances and mortgage programs; and to serve as a reliable source of liquidity for its membership.

As mentioned earlier, the FHLB has more debt outstanding than both Fannie Mae and Freddie Mac. At the end of August 2005, the Federal Home Loan Banks had \$891 billion of debt outstanding, which was about \$100 billion more than Fannie Mae and \$150 billion more than Freddie Mac. While impressive, the numbers actually reflect the debts of the system's 8,000 member lenders, which are part of a cooperative of 12 regional

Federal Home Loan Banks residing in the following cities: Atlanta, Boston, Chicago, Cincinnati, Dallas, Des Moines, Indianapolis, New York, Pittsburgh, San Francisco, Seattle, and Topeka. As described by the FHLB, each of the 12 Federal Home Loan Banks (FHLBanks) has its own president and board of directors, with 12 distinct sets of customers, all with differing kinds of demand for their products, services, and expertise. The FHLB cooperative structure is ideal for serving the system's 8,000 member lenders because each regional FHLBank manages and is responsive to its customer relationships. Meanwhile, the 12 FHLBanks use their combined size and strength to obtain the necessary funding at the lowest possible cost. Members of the FHLB include savings banks, commercial banks, credit unions, and insurance companies. As of September 30, 2004, about three-fourths of FHLB members were commercial banks, 15% were thrifts, and the rest were credit unions and insurance companies.

The FHLB advances funds to its members, which then lend the money to prospective home buyers. The FHLB obtains its money by selling debt securities in the capital markets. The FHLB's office of finance acts as the central debt issuance facility for all 12 FHLBanks. The FHLB sells a variety of securities including discount and medium-term notes, and callable and putable bonds.

FHLB's biggest source of funds is its discount notes program. In 2005, the FHLB issued \$1.389 trillion of securities under this program. Since January 2000, the discount notes program has been Internet-based. Discount notes are available in maturities of one year or less, with most sold in 1- to 60-day maturities. Discount notes are sold twice per week, on Tuesdays and Thursdays through the 14 members of the FHLB selling group.

In July 1999, the FHLB established a benchmark securities program called the TAP issue program in order to provide for the regular issuance of large and liquid issues preferred by the marketplace, "tapping" the market as needed. The TAP issue program aggregates the most common maturities consisting of 2-, 3-, 5-, and 7-year notes by reopening them over a three-month period, thus increasing the size of each individual issue. The issues are sold through competitive electronic auctions. The bidding group for TAP securities consists of 23 dealers. Dealers must submit bids of at least \$25 million. Bids above the minimum must be in increments of \$5 million. Dealers in the TAP bidding group are expected to monitor the electronic auction site for TAP announcements at 11 a.m. (ET). Dealers also receive information about the auctions via e-mail.

Over \$250 billion in TAP securities have been sold since 1999. Yields on TAP securities trade at a yield spread similar to those for securities issued by Fannie Mae and Freddie Mac.

Other Federal Agencies

So far we've discussed the largest federal agencies. Below are a few other federal agencies.

Farm Credit System Established in 1916 and the oldest of the GSEs, the *Farm Credit System (FCS)* is a network of borrower-owned lending institutions and affiliated service entities that lend to the agricultural sector. Its stated mission is to provide sound and dependable credit for agricultural producers, cooperatives, and certain farm-related businesses.

The farm credit system is composed of about 100 financial institutions, which provide credit to the agricultural sector. The system banks do not take deposits; funds for loans are obtained through the issuance of farm credit debt securities. At the end of February 2006, the FCS had \$115.5 billion of debt outstanding, roughly half of which were fixed rate, farm credit bonds. The next largest of the securities outstanding were floating rate farm credit bonds, with \$23.1 billion outstanding. Third largest in outstandings were farm credit designated bonds, at \$21.6 billion.

In addition to those just mentioned, the farm credit system issues a variety of other debt securities including discount notes and medium-term notes. *Farm credit discount notes* are short-term instruments issued at a discount to par with maturities of 1 to 365 days. They are sold in minimum denominations of \$5,000 and in additional increments of \$1,000. They are generally offered each day through the system's *discount note dealers*.

In early 2006, investment managers accounted for 54% of the distribution of new discount notes, followed by corporate entities at 14%, banks and credit unions at 10%, and state and local governments also at 10%.¹⁸

Student Loan Marketing Association The *Student Loan Marketing Association*, or *Sallie Mae*, was originally created in 1972 as a GSE, but it began privatizing in 1997 and became a public company in 2004. Sallie Mae owned or managed student loans for 9 million borrowers at the end of 2005.

¹⁸ Source: Farm credit system based on reported sales by selling group dealers.

Sallie Mae purchases insured student loans and extends credit to lenders secured by student loans. Sallie Mae funds its lending activity through its issuance of discount notes, medium-term notes, euro medium-term notes, and other debt securities. It had roughly \$80 billion of securities outstanding in mid-2005.

Resolution Funding Corporation The *Resolution Funding Corporation (REFCorp)* was created in 1989 as the funding agent for the *Resolution Trust Corporation* through the Financial Institutions Reform, Recovery, and Enforcement Act of 1989 (FIRREA) to act as the federal government's agent in disposing of insolvent savings and loans. It was the third such entity responsible for getting rid of large quantities of troubled real estate. The first entity ever created for such a task was the Home Owners Loan Corporation (HOLC) in 1933 to refinance home mortgages and foreclose on defaulted mortgages and sell the foreclosed houses. The second entity was the Federal Asset Disposition Association (FADA), which was created in 1985 to manage and sell assets owned by the Federal Savings and Loan Insurance Corporation (FSLIC).

REFCorp issued approximately \$30 billion in debt securities between 1989 and 1991, and it will be dissolved, as soon as practicable, after the maturity and full payment of obligations issued by it. All \$30 billion of the debt was outstanding at the end of 2004. The U.S. government guarantees all the interest payments on REFCorp's debt securities, and the principal is fully backed by zero-coupon bonds.

Financing Corporation (FICO) A crazy patchwork of regulations that required S&Ls to pay depositors fixed rates and to make fixed-rate mortgages in a rising rate environment got S&Ls in trouble during the 1980s. By the time deposit rates were deregulated in the early 1980s and adjustable-rate mortgages were permitted, many S&Ls were already deeply in the red. To help them out, they were given various goodies including new investment powers which helped a number of them lose money in previously forbidden ways. Finally, large-scale fraud entered some areas of what was once a solid, if sleepy, industry.

By mid-1988, the total assets of "unhealthy" thrifts—those having a net worth of less than 3% of assets—equaled about a third of the industry's total assets.

The Federal Savings and Loan Insurance Corporation (FSLIC) lacked sufficient cash to bail out big insolvent thrifts, so it invented FSLIC

promissory notes as a substitute for cash. In 1988, FSLIC asked Congress for a federal guarantee for its notes, but didn't get it. Since FSLIC had for a number of years been technically bankrupt, many cast a dubious eye on the practice of S&Ls carrying FSLIC notes on their balance sheets at par.

To stanch the losses being incurred by sick thrifts, FSLIC needed funds to recapitalize. Begrudgingly, Congress in 1987 created a new federal agency, the *Financing Corporation*. *FICO* was authorized to sell \$10.8 billion of bonds over three years and funnel the cash thus raised into FSLIC. That money was a meager fraction of what FSLIC needed, but House Speaker James Wright, well financed by the Texas thrifts, was determined that FSLIC not get sufficient funds to close down Texas's huge and ailing thrifts, who needed time to "work out their problems," which meant, euphemisms aside, time to lose a few more tens of billions of what ultimately were clearly going to be taxpayers' dollars.

To defease principal on FICO bonds, the 12 district Federal Home Loan Banks pooled funds from retained earnings to buy Treasury zeros that match in maturity and face value the \$8.17 billion of bonds FICO eventually issued. Interest payments on the debt are funded by an assessment on banks and savings and loan institutions. Banks were not responsible for the interest payments until the Deposit Insurance Funds Act of 1996 which obligated them to pay 20% of the interest paid by savings and loan institutions during the period from 1997 through 1999. Thereafter, banks were required to share the interest costs equally with the S&Ls. All of the \$8.17 billion in FICO debt was outstanding at the end of 2004.

Farm Credit Financial Assistance Corporation (FACO) From 1985 on, it was clear that the Farm Credit System was in deep trouble; and for a period, its securities traded at rates reflecting investor distrust of the agency's credit. Farm Credit's problems reflected a number of factors. Back in the go-go 1970s, system bankers urged farmers to borrow more; inflation would take care of repayments. Later, in the early 1980s, declining farm prices and accelerating inflation caused the collateral that backed farm loans to decline in value, and, at the same time, some farmers fell behind in payments. To add to the system's woes, it was composed of about 40 primary banks and hundreds of local lending outlets run by local boards with no central guidance. Finally and astonishingly, the system did not begin to track its quarterly earnings until 1984, and it wasn't until 1985 that it let an outside auditor inside its doors. The auditor and others found at Farm Credit a set of home-brewed accounting standards that masked bad

lending and lax regulation—system bankers were recording interest payments, and thus profits on loans that were three or four years delinquent.

After much foot dragging and debate, Congress reached the obvious conclusion that it could not let the Farm Credit System fail. In December 1987, Congress finally approved a \$4 billion rescue package for the tottering system. This bailout surpassed in size previous federal bailouts of New York City, Chrysler, and Lockheed.

The rescue package chartered a new agency, the *Financial Assistance Corporation*, now known as the *Farm Credit Financial Assistance Corporation*, or FACO. FACO was authorized to issue \$3 billion of bonds in 15-year maturities and issued \$1.261 billion of debt securities between 1988 and 1990, which it provided to system institutions in return for preferred stock. All the debt remains outstanding. Interest on these government-backed bonds was to be paid by the Treasury over the first five years, split by the Treasury and the system over the second five years, and paid by the system over the third five years. FACO securities are issued by the staff of the office for finance of the Federal Farm Credit Bank, and the funds raised are funneled into the Farm Credit System.

Federal Agricultural Mortgage Corporation The *Federal Agricultural Mortgage Corporation* (*Farmer Mac*) was created by the Agricultural Credit Act of 1987, which added a new Title VIII to the Farm Credit Act of 1971. Farmer Mac's statutory authority has been amended three times since then including (1) in 1990 to create the Farmer Mac II program at the request of the USDA; (2) in 1991 to clarify Farmer Mac's authority to purchase its guaranteed securities it; established the Farm Credit Administration's Office of Secondary Market Oversight as Farmer Mac's financial regulator and set minimum regulatory capital requirements for Farmer Mac; and (3) in 1996 to streamline the operating structure to be more competitive (allowing Farmer Mac to buy loans directly from lenders and issue guaranteed securities representing 100% of the principal of the purchased loans, modifying capital requirements and other changes).

Farmer Mac is a stockholder-owned, federally chartered agency of the United States whose stated mission is to create a secondary market for agricultural real estate and rural housing mortgage loans. Farmer Mac achieves its mission by providing liquidity and lending capacity to agricultural mortgage lenders. It does this by purchasing newly originated and preexisting ("seasoned") eligible mortgage loans directly from lenders

through its “cash window” and seasoned eligible mortgage loans from lenders and other third parties in negotiated transactions; issuing long-term standby purchase commitments (LTSPCs) for newly originated and seasoned eligible mortgage loans; exchanging newly issued agricultural mortgage-backed securities guaranteed by Farmer Mac (Farmer Mac guaranteed securities) for newly originated and seasoned eligible mortgage loans that back those securities in “swap” transactions; and purchasing and guaranteeing mortgage-backed bonds secured by eligible mortgage loans, which are referred to as AgVantage bonds.

Farmer Mac purchases agricultural mortgage loans from mortgage lenders such as mortgage companies, savings institutions, credit unions, and commercial banks. Farmer Mac either packages these loans into agricultural mortgage-backed securities (AMBS), which it guarantees for full and timely payment of principal and interest, or purchases these loans for cash and retains the mortgages in its portfolio. Farmer Mac obtains the funds for these activities by selling debt securities in the capital markets. Farmer Mac obtains most of its funding through two types of funding vehicles: discount notes and medium-term notes. These activities are similar to those of Fannie Mae and Freddie Mac.

Farmer Mac’s discount notes are available in maturities from 1 to 365 days, and the minimum investment is \$1,000. Additional amounts are available in \$1,000 increments.

At the end of 2005, Farmer Mac had \$4 billion of debt securities outstanding.

Tennessee Valley Authority The *Tennessee Valley Authority (TVA)* is a profit-neutral, government-owned utility company and the nation’s largest power company, providing power to nearly 8.5 million residents in the Tennessee Valley.

The TVA was established in May 1933 as part of President Roosevelt’s effort to lift the United States out of the Great Depression. In creating the TVA, Roosevelt asked Congress to create “a corporation clothed with the power of government but possessed of the flexibility and initiative of a private enterprise.” And so it was. In the 1930s, the TVA built dams to harness power from the region’s rivers, providing much needed electricity that helped draw new industries into the region. In the 1940s, the TVA helped to meet a surge in power needs resulting from the military effort during World War II. In the 1960s, the TVA began building nuclear power plants. Today, the TVA strives to maintain its strong position in the

power industry; for example, by carrying out extensive modernization and automation of all of its hydro plants by the end of 2005.

The TVA's activities require a great deal of capital, as evidenced by the \$23 billion in debt that it had outstanding in the middle of 2006. The TVA has a federally mandated debt ceiling of \$30 billion. To finance its operations, the TVA issues discount notes and long-term bonds called *power bonds*. It also sells Valley inflation-indexed power securities (VIPS) and putable automatic rate reset securities (PARRS). These bonds trade on the New York Stock Exchange under the symbols TVC and TVE, respectively. In March 2006, the TVA issued \$1 billion of 50-year bonds, receiving bids for twice as much. The TVA hailed it as the largest issuance of 50-year bonds ever by either a U.S. agency or company, and with the lowest coupon ever for a 50-year, at 5.375%. The TVA's bonds are backed by the net power proceeds of the TVA power system and are neither obligations of nor guaranteed by the U.S. government, but the interest earned on the TVA's debt securities is exempt from state and local taxes.

The Growth of GSEs and the Implicit Guarantee of Their Debt With the exception of one of the eight government-sponsored enterprises, the GSEs are not backed by the full faith and credit of the U.S. government. Importantly, this means that they carry an element of credit risk. Nevertheless, as government-sponsored agencies, many investors believe that the GSEs have an *implicit guarantee*. In other words, investors feel that the U.S. government would likely take extraordinary measures to help the agencies in the event that they were to encounter financial difficulties.

Passmore contends that (1) the government's ambiguous relationship with Fannie Mae and Freddie Mac imparts a substantial implicit subsidy to GSE shareholders, (2) the implicit government subsidy accounts for much of the GSEs' market value, and (3) the GSEs would hold far fewer of their mortgage-backed securities in portfolio and their capital-to-asset ratios would be higher if they were purely private.¹⁹

It's easy to understand why investors believe that there is an implicit guarantee, even if they are not entirely technically correct. Investors look at Fannie Mae, for example, the GSE which has helped 63 million families

¹⁹ Wayne Passmore, "The GSE Implicit Subsidy and the Value of Government Ambiguity," *Finance and Economics Discussion Series*, Board of Governors of the Federal Reserve System, May 2005.

to own their own home since 1968 and they conclude that with numbers like that the U.S. government would almost certainly do its utmost to ensure that Fannie Mae and the other GSEs stay in business. They figure that if the U.S. government was willing to help bail out Chrysler, it would probably bail out the GSEs, too. Legislation is expected to rein in the size of the GSEs, as many legislators believe that the GSEs could fulfill their mission even if they held far fewer mortgages in their portfolios. Some worry about how the legislation might affect mortgage rates and the supply of credit available for home buying. Lehnert, Passmore, and Sherlund contend that both portfolio purchases and MBS issuance have negligible effects on mortgage rate spreads and that the purchases are not any more effective than securitization at reducing mortgage interest-rate spreads.²⁰

Led by the GSEs, the agency securities market has grown rapidly in recent years. In fact, total federal agency debt outstanding roughly doubled between 1996 and 2000, and grew by another 25% between 2001 and 2003 before beginning to slow in 2004 when a boom in mortgage refinancing ended. Still, total outstandings stood 25% higher at the end of 2005 than at the end of 2001.

The sharp growth in the agency securities market has been fueled by strong growth in the housing market, with sales and homeownership rates reaching record levels during the early 2000s. This growth boosted the need for mortgages, since most homeowners take out a mortgage to buy their homes, and the GSEs play a major role in the financing of mortgages.

Fueling the growth of the housing market in the early 2000s was the extraordinarily low level of interest rates. In addition, there was a plentiful supply of credit, with many lenders loosening their lending standards and engaging in what some saw as imprudent lending practices. Indeed, data from the Federal Reserve's quarterly surveys of senior loan officers show that lending standards loosened during nearly every quarter of the early 2000s, with a greater percentage of officers reporting a loosening of lending standards than at any time since the 1980s. This impact that low interest rates had on the housing market in the early 2000s illustrates the important role that interest-rate levels play in the growth of the agency

²⁰ Andreas Lehnert, Wayne Passmore, and Shane Sherlund, "GSEs, Mortgage Rates, and Secondary Market Activities," *Finance and Economics Discussion Series*, Board of Governors of the Federal Reserve System, July 2005.

securities market. Low interest rates tend to boost originations, while higher interest rates tend to reduce originations, hence affecting the amount of securities the agencies decide to issue.

The growth rate of the U.S. economy also affects the growth of the agency securities market. During a period of weak economic activity, for example, housing demand slows, hence slowing the demand for new mortgages. This reduces the need for the agencies to issue new securities. Strong economic activity, on the other hand, tends to coincide with a strengthening of housing demand, hence boosting the demand for new mortgages and raising the need for the agencies to issue new securities.

Another factor influencing the growth of the agency securities market is the nation's demographics. In recent years, for example, aging Baby Boomers—individuals born between the years 1946 and 1964—have led to an increase in home buying. This is partly because the home-ownership rate for individuals aged 45 and up is around 80%, much more than the national average of about 69%. Baby Boomers have been using the wealth that they built during the past few decades to buy larger homes and second homes. Other positive demographics for the housing market and hence the agency securities market have been increases in the number of single-person households and immigration.

In sum, the three critical factors shaping the housing market and hence the growth of the agency securities market are the interest-rate environment, the economic climate, and demographics.

Volume in Agency Securities

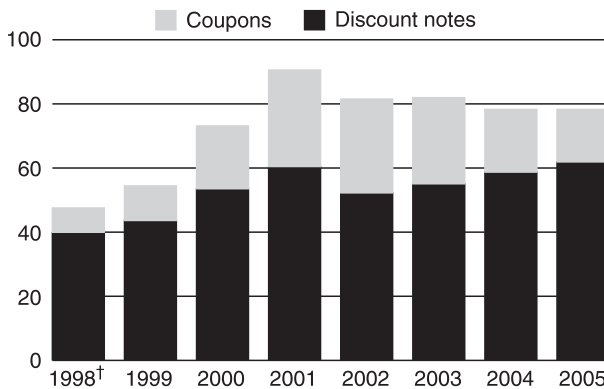
The strong growth in the size of the agency securities market has been accompanied by strong growth in its daily trading volume, although it has steadied over the past few years along with the growth rate in the amount of agency securities outstanding.

Figure 14.12 shows this. Agency trading volume doubled between 1998 and 2001 to roughly \$90 billion per day before steadying at around \$80 billion per day. While these sums fall well short of the daily trading volume in Treasuries, it is still robust enough to be considered an extremely active, deep, and liquid market with volumes exceeding that of the dollar value of U.S. equities traded daily on the New York Stock Exchange during the period.

One clear indication that the agency securities market is an active market is the bid-ask spread on the most active agency securities.

FIGURE 14.12

Average daily trading volume of federal agency securities,*
1998–2005 (in billions of dollars)



* Primary dealer activity.

† First year in which specified maturity levels were reported.

Sources: Federal Reserve Bank of New York, Bondmarkets.com

Fannie Mae, for example, reports that its benchmark securities have liquidity comparable to off-the-run Treasuries (Treasuries that were issued in past auction cycles), with bid-ask spreads of 0.5 to 2.0 basis points. In addition, the bid-ask spread on Fannie Mae's benchmark 10-year note is also comparable to Treasuries.

Another indication of the growing market for agency securities is in the repo market. The repo market is a market in which parties exchange collateral for cash with a simultaneous agreement by one of the parties to buy back the collateral at a specified price at some point in the future. Primary dealers often use the repo market to finance the holdings of their positions by exchanging their holdings for cash while simultaneously agreeing to repurchase (hence the term "repo") at a specified date in the future. An active repo market for agencies has been developing in recent years, pointing to active conditions in the agency securities market.

Given the steady growth in the size of the agency securities market, it is likely to continue to become an increasingly active market in the years to come, although much depends upon the impact of congressional legislation on the GSEs and the level of housing activity.

Growth Prospects for Agency Securities

The market for agency securities is likely to grow in the years ahead, even if housing demand slows and the government legislates a slowing in the growth of retained mortgage portfolios at the GSEs. One reason relates to the sheer size of the mortgage market. At over \$9 trillion, residential mortgage debt was the biggest debt that households had at the end of 2006 (households had about \$13 trillion in debts at the end of 2006). Importantly, only about half of all mortgage loans have been securitized. In other words, companies such as Fannie Mae have repackaged only about half of all mortgages into securities. This leaves plenty of room for continued growth.

One potential obstacle to growth of the GSEs is the emergence of concern voiced by members of Congress over the so-called implicit guarantee that the GSEs enjoy. Banking regulators such as the Federal Reserve and some members of Congress are concerned that the GSEs are borrowing too heavily and that the borrowing binge may one day put taxpayers at risk of having to bail them out. Former Federal Reserve Chairman Alan Greenspan put it this way in testimony that he gave before the Housing Banking Committee on April 6, 2005:

The strong belief of investors in the implicit government backing of the GSEs does not by itself create safety and soundness problems for the GSEs, but it does create systemic risks for the U.S. financial system as the GSEs become very large.

The support for GSE reform appears strong enough that it will likely restrain the growth of the GSEs, all else remaining equal.

Still, the GSEs are likely to continue to play a major role in the financing of home purchases because, without GSEs such as Fannie Mae and Freddie Mac, fewer mortgages would likely be issued, and the housing market would weaken. The hope is that if the GSEs buy fewer mortgages, the lost purchases would be offset by both a broadening of ownership of mortgage debt and increased securitization of the percentage of mortgages outstanding. For investors, demand for agency debt will likely stay strong enough to support growth in the agency securities market. Investors will likely remain attracted to the higher yields that agency securities provide compared to U.S. Treasuries. Moreover, GSEs are likely to continue to be seen as an attractive alternative to high-grade corporate bonds, given the low risks perceived to be associated with agency securities.

Agency Mortgage-Backed Securities

Mortgage-backed securities (MBS) are perceived as one of the more complex segments of the bond market. This is understandable in light of the considerable differences that exist between mortgage-backed securities and conventional bonds. Two of the biggest differences relate to the very different structure of their cash flows and maturity dates. With most bonds these two characteristics are pretty straightforward and predictable, but they are far more uncertain with mortgage-backed securities. For investors this presents both risks and opportunities. For most investors, however, a basic understanding is enough to keep them away from some of the pitfalls of investing in mortgage-backed securities and to capitalize on the attractive yields and many opportunities that the MBS market presents.

In its simplest form, a *mortgage-backed security* is a pool of mortgages that have been securitized, or repackaged, so that they can be sold to investors. Investors in mortgage-backed securities share many of the same experiences that banks do when they issue mortgage loans. For example, both receive regular payments of principal and interest on the mortgage loans; both are subject to prepayment risks; and both are subject to effects from defaults on mortgage loans. One of the most basic forms of a mortgage-backed security is a *mortgage pass-through* security, also known as a *participation certificate*. A mortgage pass-through security represents pro rata ownership interest in the principal and interest payments of a pool of mortgage loans. The cash flows are said to “pass through” from homeowners and other property owners to the holders of the pass-through securities. The payments are made regularly, generally on a monthly basis, and include both principal and interest. *Most pass-through securities are issued by government agencies*. These include Fannie Mae, Freddie Mac, and Ginnie Mae. Pass-through securities that are issued by nongovernment entities are called *private-label mortgage-backed securities*. These securities are typically constructed with a pool of large mortgages taken out by individuals with above-average income.

The interest paid on a pass-through security is lower than the interest rate paid on the underlying mortgages for a couple of reasons. First, when either a government agency or a private-label company creates a mortgage-backed security, it normally pays a service fee to the institutions from which it purchased the mortgages that underlie the mortgage-backed security. The mortgage lenders that sell their mortgages generally retain servicing of the loans and collect a fee for collecting payments from homeowners

and for performing other functions. A second factor that reduces the actual interest payment on a pass-through security relates to the fee paid by investors to government agencies for the government's guarantee of the mortgage loans. Fannie Mae, for example, collects a *guaranty fee* for its guarantee of the timely payment of principal and interest on the securities. Fannie Mae's guarantee is solely its own and does not have the backing of the full faith and credit of the U.S. government. Ginnie Mae's securities, on the other hand, have the government's backing.

Distribution

As mentioned, federal agencies usually distribute new coupon issues through selling groups. An agency will announce the size of a new issue to be offered. At that time, the members of its selling groups begin to distribute the issue by determining (*circling* in Street jargon) customer interest in it. Small banks and other investors who aren't rate conscious will often put in a *market order* for the new issue—agree to buy it before it is priced. Other buyers will make a *subject bid*—agree to buy some amount of the issue if its coupon is set at rate *X* or better.

Dealers are each allocated a specific share of the total issue to be sold. They attempt to presell that share, and if they are more successful at this than other dealers, the agency increases their allocation.

The day after an agency announces a new issue, it starts to think about pricing. It makes its own reading of the market and inquiries of a cross section of dealers to determine how presales of its issue are going and where the dealers feel the coupon should be set. The agency seeks to price its issue so that it will trade close to par. Once the agency announces its pricing decision, its new issue begins to trade WI.

Dealers in a selling group get a fee, which ranges in size depending on the issuer and the size and maturity of the issue, but usually not more than \$3 per \$1,000 on whatever securities they sell. Participants in the selling group who are not involved in the underwriting of the securities make money from the spread between the price they pay for security and the market price. The selling group's function is to get the securities into the hands of a wide range of investors, not to position the new issue. However, in a sale characterized by poor retail demand, the major dealers would if necessary underwrite—buy for their own position—the new issue to get it sold.

The dealers who participate in the selling group are also market makers, and in that capacity they assume long and short positions in agencies. Sometimes after the sale of a new issue, dealers who like the issue will go back into the market as buyers and position it. This is easy to do if an issue goes immediately to a premium of a few 32nds; some buyers will want to sell out and take their profit, and that will create a floating supply. How long distribution takes depends on the initial reception an issue gets in the market. If it is weak, the securities may overhang the market for a longer period.

REVIEW IN BRIEF

- There were \$4.2 trillion of *Treasuries* outstanding at the end of 2005, making the Treasury market the third largest segment of the \$25 trillion U.S. bond market.
- The Treasury market is by far the most active segment of the U.S. bond market, and it is the most active government bond market in the world, with \$554.5 billion of Treasuries traded daily.
- Treasuries are sold in three principal varieties: *bills*, *notes*, and *bonds*. The U.S. Treasury also sells *inflation-protected securities*.
- Treasuries are sold primarily through *primary dealers*, which are banks and securities broker dealers that trade in U.S. government securities with the Federal Reserve System. There were 22 primary dealers in late 2006.
- Currently, the Treasury sells all its marketable debt through *auctions*. Auction participants can submit either a competitive or a noncompetitive bid that specifies the minimum yield that the participant will pay.
- Treasury auctions are conducted in a single-price format, which was first introduced in 1992 following several violations of auction rules in 1991. Single-price auctions are sometimes known as *Dutch auctions*. Empirical analysis of the auction format was compelling enough for the Treasury in 1998 to switch all its auctions to the single-price format.
- Until 1993, bids were submitted in paper form either in person or by mail at the Treasury Department in Washington, D.C., or at a Federal Reserve Bank or Branch. Under the current system,

which has been in place since 1993, bids are submitted electronically, and auction results are released usually within two minutes of the close of bidding, which is usually at 1 p.m.

- The Treasury utilizes a computer application called TAAPS (Treasury Automated Auction Processing System), which is a system that aggregates both the competitive and noncompetitive bids submitted to the Treasury.
- It is often said that large U.S. budget deficits and the large Treasury auctions that result from the deficit boost interest rates. While a relatively basic concept, recent history doesn't seem to provide a lot of support to this view given the steady decline in U.S. interest rates that has occurred over the past 25 years despite budget deficits in most of those years except the period 1998–2001.
- A large portion of Treasury volume is done through *interdealer brokers (IDB)*. Most government securities transactions that are done through brokers take place via *electronic communication networks (ECNs)*. Two firms dominate the interdealer broker market for secondary market transactions in government securities: ICAP PLC, which had a market share of 60% in 2005, and Cantor Fitzgerald, which had a 28% share.
- There are five main types of electronic trading platforms: *cross-matching*, *single-dealer*, *auction*, *interdealer*, and *multidealer*. One of the more popular of these is the Internet-based *TradeWeb*.
- The market for notes is the largest and most active part of the Treasury market. At the end of February 2006, there were \$2.39 trillion of notes outstanding, much more than bills, at \$997 billion, and bonds, at \$526 billion.
- Primary dealers customarily hold net short positions in Treasuries as hedges against other fixed-income securities that they hold. Indeed, dealers were net short in every week during the 4½ years ending March 2006.
- In various studies, the *yield curve* has been proven to be a superior financial indicator. Estrella and Mishkin found that the yield curve spread between the 10-year Treasury note and the 3-month T-bill was one of the most successful models of recession four quarters in the future.

- One of the more popular theories behind the low level of long-term interest rates of recent years has been attributed to a drop in term premiums. Low inflation expectations, increased Fed credibility, increased foreign buying, and global pension reform are other factors likely at play.
- In January 1997, the Treasury began issuing *inflation-protected securities (TIPS)*. TIPS are indexed to the Consumer Price Index for All Urban Consumers (CPI-U). The *break-even rate* on TIPS is used by many as a gauge of the bond market's inflation expectations.
- *Zero-coupon securities* (note and bond issues carrying a zero coupon), or *STRIPS*, represent a relatively small portion of the Treasury market, with \$183 billion outstanding in early 2006, down from a peak of about \$230 billion in 1998. The process of stripping Treasuries into zero-coupon securities takes under a half hour and costs just \$25.
- There are two main types of *federal agency securities*: *government-sponsored enterprises (GSEs)*, and federally related institutions. Most agency securities are issued by the housing-related GSEs. The largest are Fannie Mae, Freddie Mac, and the Federal Home Loan Banks.
- The agency securities market has become deep and liquid, as evidenced by high daily trading volumes, tight bid-ask spreads, tight yield spreads to Treasuries, and the existence of a repo market for agencies.

Financial Futures: Bills, Eurodollars, and Fed Funds

Forward transactions are common in many areas of economic activity including the markets for commodities. *In a forward transaction* a seller agrees to deliver an asset to a buyer at some future date at some fixed price. For example, a farmer growing corn might, before the harvest, sell some portion of his crop to a buyer at a fixed price for delivery at harvest. For the farmer, this transaction reduces risk. To grow corn, the farmer incurs various costs; by selling his corn forward, he guarantees the revenue he will receive for his corn at harvest, and he thus locks in a profit on his operations. That profit may be more or less than what he would have earned if he had waited to sell his crop at harvest at the *spot* price then prevailing in the *cash market* (market for immediate delivery) for corn.

FUTURES VERSUS FORWARD CONTRACTS

Most *futures contracts*, like many forward contracts, specify that the seller of the contract will deliver to the buyer a specific amount of a specific item at a specific price on a specified future date. However, many financial futures contracts call for cash settlement, as is shown later in the chapter. Any forward or futures contract can be settled equitably with either delivery or a cash payment, although most financial futures are settled with a cash payment. Which method is used is pretty much a matter of

history—which method was initially adopted for reasons of legality, custom, or convenience.

While futures contracts are similar to forward contracts in certain respects, they differ in other important respects. First, whereas forwards are normally custom-tailored contracts, *futures are standardized contracts made and traded on exchanges that are chartered, designated, and licensed to serve as a trading arena in specific futures contracts*. Second, whereas forward contracts are normally made with the intent that either delivery or a cash payment shall be made at expiration of the contract, *delivery is usually not made in connection with a futures contract even if the contract contains specific delivery provisions*. Instead, a buyer of a futures contract will typically close out his position before the contract matures by making an *offsetting sale* of the same contract, a seller by making an *offsetting purchase*. Less than 2% of outstanding futures contracts are eventually settled by delivery.

The reason delivery is not made is that people typically enter into futures contracts not to buy or sell an item, physical or financial. Instead they want either (1) to offset risk on a long or short position, that is, to hedge that position by taking an equal and offsetting position in futures; or (2) to speculate on a change in the price of an item or in the spread (measured in price or yield) at which it trades in relation to some other item. The hedger attempts to put himself in a position where any losses he incurs on his cash position (e.g., he is long *X*, and the cash-market price of *X* drops) will be offset by an equal gain on his futures position. As shown in examples below, the hedger can accomplish this by establishing a position in futures and later closing it out. The speculator, who neither owns nor desires to own the underlying commodity or financial instrument, can also realize whatever gain or loss he makes on his speculation simply by closing out his position in futures.

For a hedger, a transaction in futures is often a temporary substitute for a transaction in the cash or spot market. For example, a bond trader at a big shop might, as noted in Chapter 14, be asked to bid on \$250 million of bonds. He bids, and his bid is hit, but he does not want such a big and risky long position in bonds. Maybe he can sell right away in the brokers' market \$100 million of the bonds he has just bought, either at a small profit or at least at no loss. To cover the other \$150 million, he would short bond futures, the market for which is deep and liquid. This trade, which is shown later, leaves our bond trader long the basis (between cash bonds and futures). As the basis fluctuates, our trader hopes he will next be able

to sell the basis at a profit and thus end up (1) being flat both bonds and the basis and (2) having made a small profit to boot.

UTILITY OF FUTURES TO INVESTORS

Investors find many reasons to trade futures as opposed to other instruments. *Liquidity* is one of them. Investors seek liquidity because they want to enter and exit transactions without any meaningful impact on price. Liquidity tends to be present in the most actively traded financial futures, such as Treasury notes and bonds and Eurodollar contracts. Markets for these are deep and liquid. For other instruments, where trading volumes may not be as high, the futures exchanges deploy market-maker systems to provide double-sided markets (bids and offers).

Futures are also sought for the *transparency* that they provide with respect to market prices and market activity. In a transparent market, investors can readily discern both the size and price of the bid and offer flows. This is not always the case in the cash market in which the fair market price and the size of the bids and offers are not as clear.

Many investors use futures because of the *leverage* they provide. Futures enable investors to control very large amounts of either the commodity or financial security that underlies the future without having to use much capital, relatively speaking. For example, the margin requirement set by the Chicago Board of Trade for speculators in 5-year Treasury futures was \$540 in September 2006, meaning that an investor could buy or sell one 5-year Treasury future carrying a face value of \$100,000 by depositing a relatively small \$540 initial margin deposit.

A major advantage of futures trading is that it can help investors to reduce *counterparty risk*. Investors in any financial transaction like to feel assured that the party on the other end of their transaction will fulfill his obligations. In the futures market, this assurance is provided by both the clearing service providers and their clearing member firms. Both act as the counterparty to every futures trade, guaranteeing to make good on all trades even if the counterparty fails on his obligation on the trade.

Portfolio diversification is another use for futures. They enable investors to invest in asset classes that are not always easy to access. For example, if an investor wants to invest in foodstuffs, he can do so by utilizing the numerous futures that exist for that industry. The same could be said about foreign currencies, precious metals, energy products, livestock, foreign equity indexes, and many other types of interest-rate futures.

FORWARD TRANSACTIONS IN THE MONEY MARKET

Forward transactions are common in the money market. For example, all when-issued (WI) trading of Treasuries is trading for forward settlement. Other forward trades of Treasuries are also done. To illustrate, suppose that an insurance company sells a *guaranteed income contract (GIC)* for a principal amount of \$10 million to be paid to it three weeks hence; the insurance company, having sold the GIC, now needs to protect itself against a fall in interest rates over the coming three weeks. One way this company could lock in today's rate levels would be by buying for settlement three weeks hence, say, \$10 million of 10-year notes. Assume it does so. Then when the money due it from the sale of the GIC comes in, the insurance company will pay for and take delivery of the 10-year notes it previously purchased for forward delivery. Next, it would probably sell these notes to acquire more exotic, higher-yielding assets.

This example suggests an interesting question: What relationship is likely to prevail between spot and forward prices? For physical commodities such as gold or wheat, forward prices almost always exceed *spot (cash-market)* prices because goods stored for forward delivery must be financed; also, storage and insurance costs must be paid. In financial lingo, *carry* on physical commodities is always negative, and for this reason, one would expect the forward price of a physical commodity to exceed its spot price. The fact that consecutive (more distant) gold futures contracts always trade at higher and higher prices relative to the spot price of gold reflects the positive cost of financing, storing, and insuring physical gold (Table 15.1). When futures prices trade at higher and higher prices in consecutive months, this is a condition known as *contango*. There are cases where forward prices trade at discounts to spot prices, generally reflecting expectations for a sharp change in the supply and demand picture. Such a condition is known as *backwardation*. Seasonal fluctuations in the demand for certain physical commodities are one explanation for backwardation.

The logic that dictates that forward prices will generally exceed spot prices for commodities does *not* apply for financial instruments. In the above example, a dealer was asked to offer \$10 million of 10-year notes for forward delivery; under normal market conditions—the yield curve slopes upward—he would offer 10-year notes for forward delivery at a price *less than* their spot (cash-market) price because *carry* on the notes

TABLE 15.1

Gold prices: spot (cash) and futures as of September 6, 2006

Gold (100 Troy Ounces)	Price (\$ per Troy Ounce)
Spot	639.25
<i>COMEX futures</i>	
September 2006	638.50
October 2006	640.70
November 2006	643.80
December 2006	646.90
February 2007	653.20
April 2007	659.40
June 2007	665.50

Source: COMEX division of the NYMEX

would be *positive*: the term (3-week) repo rate would be less than the yield at which the notes were trading. The forward price of a financial instrument may equal, be less than, or exceed its cash-market price. Which it depends on the sign and size of carry whenever the instrument traded for forward delivery is a security that has been issued and is trading in the cash market.

Other sorts of forward deals are also struck in the money market. A bank may agree to do a 3-month Eurodollar time deposit with another bank three months hence at an agreed rate that reflects both parties' expectations as to the direction of interest rates. Such a transaction is called a *forward forward*. A forward rate agreement (FRA) resembles a forward forward except that on settlement date, no deposit changes hands; instead there's a cash payment between the contracting parties based on the relationship between the rate at which the trade was done and the market rate at the time of settlement. In a FRA, both parties are betting on a future interest rate. If rates move such that one party loses X on his bet, the other party wins X (FRAs are a zero-sum game). Forward forwards and FRAs are, in effect, over-the-counter (OTC) versions of formal futures contracts; forward forwards are forward contracts settled with delivery, whereas FRAs are forward contracts settled with a cash payment.

Interest-rate swaps are also sometimes done for forward settlement, particularly in what's called the IMM (International Monetary Market) swap (Chapter 19). These are 1-year forwards that start when a specific Eurodollar contract expires. Finally, we recall that repo financing is traded for forward delivery during the period when a Treasury issue trades when-issued (WI). This permits a trader to lock in both the yield he will receive on the issue and the financing rate he must pay when the issue settles and securities are delivered to him. In the case of WI securities, forward repos, FRAs, and interest-rate swaps done for forward settlement, the long in such a trade has nothing to carry (no security to finance); consequently, the forward price established in the market presumably represents simply the consensus view of traders as to what a specific rate or price will be on a specific forward date.

Often, money market participants assume forward positions to reduce risk. However, they also can and do take forward positions to assume risk—to make bets on future rates or prices—and to put on one leg of a sometimes complex arbitrage.

FINANCIAL FUTURES

In 1972, the Chicago Mercantile Exchange pioneered the first currency futures contracts. The notional value of such contracts increased substantially over the years and stood at \$347.5 billion in March 2003. The introduction of currency futures trading in 1972 paved the way for the introduction of many other financial futures such as the 3-month Treasury bill, which was introduced in January 1976 by the IMM, which is now part of the Chicago Mercantile Exchange (CME). Even before trading began in T-bill futures, the trading of futures contracts for financial instruments was not new. In October 1975, the Chicago Board of Trade opened trading in futures contracts for Ginnie Mae pass-throughs. Still, introduction of the bill futures contract was an important innovation for the money market because trading in Ginnie Mae pass-throughs as well as foreign exchange lies at the fringe of what could strictly be called *money market activities*.

In contrast, the bill market has always been a key sector of the money market, and as part of their normal investing or borrowing activities, many money market participants once found potential uses for sales or purchases of bill futures.

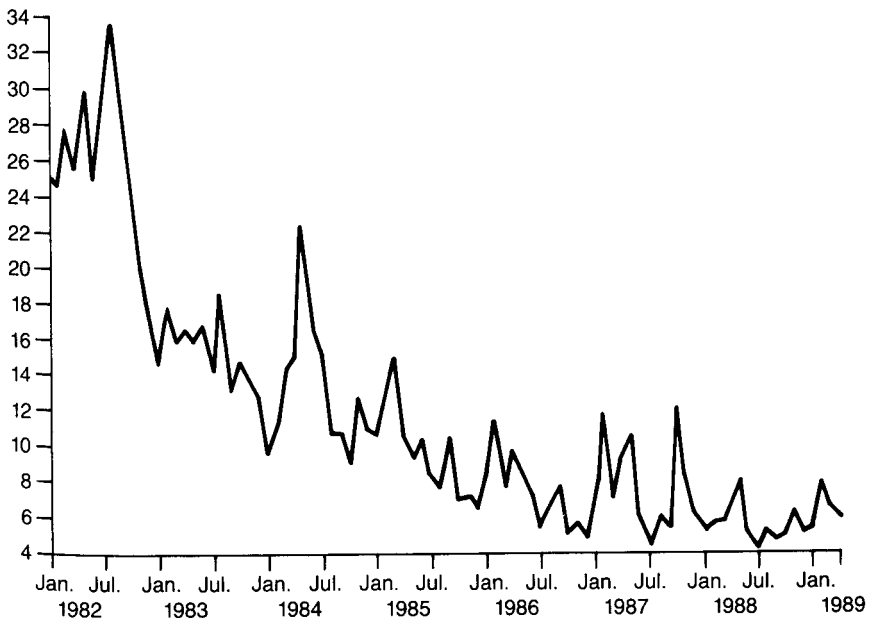
The initial reception of bill futures by the Street was marked by uncertainty and coolness. The dealers looking at the new market all

groped for the “right numbers”; they asked what the relationship between spot and futures prices should be and how they could profit from trading in the new market. Many investors were confused about the nature of the contract and uncertain as to how they might or should use it. Also, some felt that a contract traded by “commodities speculators” next to the pork belly pit was suspect.

Nonetheless, the volume of contracts traded in the bill futures market rose (Figure 15.1) through 1982 rapidly and dramatically before beginning a long decline; in fact, for a time, the market in bill futures came to be used more widely than any futures market ever had been. One reason was that dealers in governments quickly became active participants in the new market, following a pattern well established in other futures markets where dealers who position the commodity traded are big buyers and sellers of futures contracts.

FIGURE 15.1

Average daily volume of the IMM Treasury bill futures contracts (in thousands)



Source: Donaldson, Lufkin & Jenrette (Chicago Mercantile Exchange)

By the summer of 1982, daily volume in the bill futures market averaged \$32 billion to \$34 billion; in contrast, the volume of bills traded daily in the cash market by all recognized and reporting dealers in governments averaged only \$20 billion to \$22 billion. This comparison was impressive for a futures market that was only six years old, and it was a sign of things to come given that the notional value of some futures contracts exceeds that of their respective cash market, especially with respect to the amount of securities available for delivery against a particular futures contract; that is, at a cost that reflects that underlying security's fair market value.

The success from the start of the Treasury bill futures contract spurred introduction by several exchanges of a host of other futures contracts on different financial instruments. Some of the new futures contracts, in particular the Chicago Board of Trade's (CBOT's) bond futures contracts, filled a real need and were highly successful. However, most new financed futures contracts quickly failed. For example, the CBOT's futures contract for 90-day, A-1, P-1 commercial paper never attracted much interest because the real market in commercial paper is for paper with an original maturity of 30 days or less; also, when delivery occurred at the maturity of this contract, the least attractive paper meeting delivery specifications was always delivered.

In 1981, the New York Futures Exchange (NYFE) introduced futures contracts in currencies, bills, and bonds with much fanfare and high hopes that these contracts would succeed since New York, not Chicago, is the capital of the money market and in particular the center of the cash market for money market instruments. In fact, all these NYFE contracts failed partly because the NYFE never had the strong locals Chicago did to build up and maintain liquidity in its contracts. Also, the initial NYFE contracts met no unfilled needs, since all—with the exception of the bond contract—were me-too imitations of contracts already traded in Chicago.

Introduction of some contracts that appeared to be obvious winners was delayed by slow-moving regulators. It was not until 1981 that trading in domestic CD futures was permitted. Unfortunately, not long after, investors came to regard some of the top 10 American banks as far better credits than others. As a result, a variant of Gresham's law—good money drives out bad money—came into play: shorts delivered consistently the least well-thought-of and thus the cheapest CDs that were deliverable under the contract. This ploy killed off the new CD contract in short order.

In 1982, trading in Eurodollar futures was finally permitted, an event that would have broad implications for the futures market and for the evolution

of the money market. Wisely, regulators permitted cash settlement of the Eurodollar contract, even though to some, the idea of a futures contract with cash settlement smacked of high-stakes gambling. Settlement of this contract by delivery would otherwise have been a nuisance and, more important, would have invited quick death, again at the hands of a variant of Gresham's law.

That a contract trades well initially is no guarantee that it will continue to do so. The GNMA contract, at first a big success, all but died because its delivery mechanism provided market participants with some nasty surprises when interest rates became high and volatile. In addition, the bill contract went the way of the dinosaur because of circumstances noted in the next section of this chapter.

Despite a number of misses, many new financial futures have been established over the years, making them much larger in terms of notional value and trading volume.

REGULATION

Futures contracts have been under federal regulation since the 1920s. Currently, trading in financial futures as well as other futures is regulated by the Commodity Futures Trading Commission (CFTC), which was created by Congress in 1974. The agency's jurisdiction over the futures market has been expanded and renewed many times over the years, including most recently via the Commodity Futures Modernization Act of 2000. The CFTC's stated mission is to protect market makers and the public from fraud, manipulation, and abusive practices related to the sale of commodity and financial futures and options, and to foster open, competitive, and financially sound futures and options markets. The CFTC consists of six major operating units, including its divisions of clearing and intermediary oversight, market oversight, and enforcement, and its offices of general counsel, executive director, and chief economist.

The CFTC first authorized trading in bill futures in November 1975 when the SEC, which regulates trading in most securities and in securities options, argued that contracts for the future delivery of securities were securities and that it should therefore have jurisdiction over the futures market in Treasury bills and other financial instruments. The CFTC countered that regulation of trading in such contracts fell within its purview because the law creating the CFTC gave it exclusive jurisdiction over trading in contracts for future delivery.

The dispute between the two agencies resurfaced in 1978 when the SEC recommended to Congress that it take over the CFTC's authority to regulate futures trading in securities. The SEC's concern over futures trading in securities was heightened by the difficulties that arose in the dealer-made, off-the-board forward market for Ginnie Mae pass-throughs, when a small dealer, Winters, whose operations had been irregular, failed.

Under Chairman James Stone, the CFTC was slow to approve new futures contracts, largely because it demanded that exchanges proposing new contracts provide extensive documentation supporting the economic justification for the contracts. When Philip Johnson took over as chairman of the CFTC in the summer of 1981, he took a more free-market philosophy; in his view, exchanges should be permitted to introduce new contracts meeting standard regulatory requirements with less *a priori* proof of economic justification. *A posteriori* the market would demonstrate whether introduction of a new contract was justified: If the new contract traded well, it fulfilled a need; if it failed, it did not.

In the summer of 1981, the CFTC finally approved not only a domestic CD futures contract, but the first of several stock index futures contracts, which provided for *cash settlement*, an innovation that had been proposed by industry participants for years.

While the CFTC began to move, its underlying jurisdictional dispute with the SEC remained; the SEC continued to argue that a futures contract on an exempt security was a security and therefore subject to SEC jurisdiction. Finally in the fall of 1981, Chairmen Johnson of the CFTC and Shad of the SEC reached a jurisdictional accord spelling out each agency's area of regulatory authority (Table 15.2). This agreement, passed into law in 1982, gives the industry guidance as to where jurisdiction lies and thus provides more certainty to would-be-proposers and users of new contracts.

The accelerated pace at which federal regulators began to approve new contracts led to a rapid expansion in the menu of securities—financial futures, options on fixed-income securities, and options on futures—being traded. The specifications of the principal financial futures contracts and of options on those contracts that are traded on U.S. exchanges can now be readily found on the Web sites for these exchanges.

FUTURES BASICS

To begin our discussion of financial futures, we examine the basics first: the basic contract terms, how the contracts are quoted, the clearing function of

TABLE 15.2**SEC-CFTC jurisdictional accord in 1981**

- I. SEC jurisdiction
 - A. Options on any security including:
 - 1. U.S. government and other exempt securities
 - 2. Certificates of deposit
 - 3. Any index of securities
 - B. Also options on foreign currencies
- II. CFTC jurisdiction
 - A. Futures contracts including:
 - 1. U.S. government and federal agency exempt securities
 - 2. Broad-based indexes of securities
 - 3. All currently traded futures
 - B. Also options on:
 - 1. Futures contracts
 - 2. Foreign currencies
- III. Prohibited
 - A. Futures contracts on corporate and municipal securities
 - B. Futures contracts on narrowly based indexes of securities

the exchange, how margin is handled, how the market for futures contracts are made, how the contracts may be used for hedging and other purposes, the symbols used, and who the market participants are.

With respect to basics, the futures contracts for all fixed-income securities function similarly and are traded—with the exception of cash settlement—in pretty much the same way, so much of what follows applies to futures contracts other than Treasuries as well. The peculiarities of the bond and note futures contracts are described later.

Contract Size

The basic contract traded on the CBOT for Treasuries is for a face value at maturity of \$100,000. The exception to this is the futures contract for 2-year Treasuries, which have a face value of \$200,000. Currently, contracts expire once each quarter—in March, June, September, and December. There are five contracts outstanding, so when a new contract starts to trade, the furthest delivery date stretches 15 months into the future, although trading volume beyond 6 months out is quite sparse.

Eurodollar contracts have a much larger face value of \$1 million, and there is substantial liquidity in contracts that expire well into the future, even as far out as five years. Fed funds futures have a face value of \$5 million, and contracts extend as far out as 24 months, but volume is sparse beyond 4 months.

Price Quotes

Treasuries trade and are quoted in the *cash market* on a price basis; consequently, the offer always exceeds the bid. Also, when yields rise, prices fall, and vice versa. This seems reasonable to a person accustomed to trading discount paper, but it's confusing to a person who's accustomed to trading commodities or stocks. The various futures exchanges therefore decided not to quote the Eurodollar contract directly in terms of yield. Instead, they developed an *index system* in which Eurodollars are quoted at a "price" equal to 100 minus yield; a Eurodollar yield of 4% would thus be quoted at the Chicago Mercantile Exchange (CME) at 96. The CME has assigned a value of \$2,500 for each point, so a Eurodollar contract priced at 96 would have a notional value of \$240,000. Note that in this system, when yield goes down, the index price rises, and a trader who is long futures profits. This conforms to the relationship that prevails in other commodity futures markets, where longs profit when prices rise and shorts profit when prices fall.

Fed funds futures are quoted in the same way as Eurodollars are; that is, they are quoted as an index equal to 100 minus yield.

For Treasuries, prices are also quoted in points, with each point equal to \$1,000.

Tick Sizes

The minimum price fluctuation for financial futures contracts varies widely by type of instrument. Minimum price fluctuations on the benchmark 10-year Treasury future as well as for the 5-year Treasury future are in multiples of $\frac{1}{2}$ of $\frac{1}{32}$ of 1 point per 100 points (\$15.625 rounded up to the nearest cent per contract) except for inter-month spreads, where minimum price fluctuations are in multiples of $\frac{1}{4}$ of $\frac{1}{32}$ per point per 100 points (\$7.8125 per contract, rounded up to the nearest cent per contract). For T-bonds, the minimum price fluctuation is in multiples of $\frac{1}{32}$ of 1 point per 100 points (\$31.25 per contract) except for inter-month spreads,

where minimum fluctuations are the same as for 5- and 10-year notes. For 2-year notes, the minimum price fluctuation is in multiples of $\frac{1}{4}$ of $\frac{1}{32}$ of 1 point per 100 points (\$15.625 rounded up to the nearest cent per contract).

For Eurodollar contracts, trading occurs in increments of .0025, or \$6.25, per contract in the expiring front-month contract; in increments of .005, or \$12.50, per contract in the 4 serial (quarterly) and all 40 quarterly expirations.

The tick size for fed funds futures is $\frac{1}{2}$ of 1 basis point, or $\frac{1}{2}$ of $\frac{1}{100}$ of 1% of \$5 million on a 30-day basis rounded up to the nearest cent. Each tick ($\frac{1}{2}$ basis point) is therefore equal to \$20.835.

Clearing Function of the Exchanges

Whenever a trade occurs on futures exchanges such as the Chicago Board of Trade and the Chicago Mercantile Exchange, as well as the many other futures exchanges, there must be a buyer and an offsetting seller. Each trader's contractual obligation, however, is not to his counterpart in the trade but to the futures exchanges, which stand between the principals in a trade; it is the opposite side of every trade affected on the exchange, even though it never itself assumes any net position long or short in bill futures. The futures exchanges' purpose is to act as what might be called a supervisory *clearinghouse* that guarantees the fiscal integrity of every trade made on the exchanges. A futures clearinghouse is a division of a futures exchange, or an independent company working in conjunction with a futures exchange, that takes account of all transactions that occur during each trading session and ensures that all customer accounts are credited and debited accordingly.

At the Chicago Mercantile Exchange, where the highly active Eurodollar contract is traded, there exists a clearinghouse called the CME Clearing House. The CME Clearing House provides clearing services to both the CME and to the Chicago Board of Trade, which does not own its own clearinghouse. The CME Clearing House has never experienced a default, which the CME says on its Web site is a claim that not all commodity clearinghouses can make. Clearinghouses maintain their financial integrity by requiring that all holders of futures accounts post a minimum *performance bond*, or margin deposit, that varies depending upon the type of future traded. This is discussed in greater detail in the next section.

Performance Bond, or Margin Deposit

An important role for the clearinghouses is to oversee the enforcement of margin requirements (now more formally called by futures exchanges as *performance bonds*) and the monetary transfers they require. When a trader buys a contract on an exchange, he does not pay for it immediately; and if he sells a contract, he does not receive payment immediately. Both the buyer and the seller, however, must put up *margin*. To illustrate, consider the Eurodollar contract, in which the initial minimum margin requirement by the CME for positions held by speculators on September 6, 2006, was \$743 per contract (the margin for hedgers was \$550 per contract). Keep in mind that a brokerage house through which an individual trader deals may demand more margin than is required by the exchanges, but the brokerages may never require less than the exchanges demand.

When a trader assumes a long or short position, he will incur gains and losses each day thereafter as price fluctuates. The amount of each day's gain (loss) is added to (subtracted from) his margin account at the end of the day. For example, if a trader bought a contract at \$95.20 and the settling price at the end of the day on that contract was \$95.15, he would have incurred a loss equal to \$125 (5 basis points times \$25), and that money would be subtracted by his broker from his margin account. Some other trader would necessarily have made an equal and offsetting gain, and money equal to the amount of that gain would be added to his margin account. This adding and subtracting is done through the CME Clearing House, which collects money from brokers whose clients have incurred losses and transfers it to brokers whose clients have earned profits. Because margin balances are adjusted through the CME at the end of each business day (this process is known as *marking to market*), a trader starts each day having realized, through additions to or deductions from his margin account, the net gain or loss he has made on his position since he established it. The CME margin system converts on a daily basis what would be *paper* gains and losses into *realized* gains and losses.

If the balance in a trader's margin account falls below the current *maintenance margin* limit, which is less than the initial margin, he must immediately deposit additional funds (variation margin) in this account to bring it up to the maintenance margin limit. If he fails to do so, his broker is required to close out his position. If, alternatively, a trader has earned profits and his margin account has therefore risen above the margin he's required to maintain, he may withdraw the excess margin.

The CME's requirements with respect to margin maintenance guarantee that a trader's losses on a given day are unlikely to significantly exceed the amount in his margin account and thus make it improbable that any investor would end up in a position of being unable to honor a contract he had made either by liquidating his position through an offsetting trade or by making or taking delivery of securities.

If a trader takes offsetting long and short positions in the two contracts closest to maturity, he is required to put up only less initial margin, and the minimum margin he must maintain is also smaller. On offsetting long and short positions in contracts farther out on the maturity spectrum, the trader must maintain margin equal to any loss he has incurred on that position. If there is none, he need not put up any margin.

The amount of performance bond required varies by futures contract, which in turn can vary depending upon the price and volatility of the respective contracts. Exchanges set their margin requirements based on a system known as SPAN (standard portfolio analysis of risk). Established in 1988, SPAN is a risk-based, portfolio approach for calculating margin requirements on futures, options on futures, and other derivative and non-derivative instruments. SPAN has been enhanced and simplified many times over the years and is now used by most of the major futures exchanges worldwide.

Collateral in the form of securities, generally Treasury securities, may be used as initial margin so that the effective cost of putting up such margin can be reduced to close to zero. Investors are also able to reduce their margin costs when they engage in intermarket and interexchange spreads, which are trading positions that are largely offsetting owing to their close historical relationship. Examples include 5-year Treasury futures versus 10-year Treasury futures, and fed funds futures versus Eurodollar contracts.

Expiration Dates

The expiration dates for futures contracts vary. Fed funds futures have perhaps the most predictable expiration dates. Their last trading day is on the last business day of the contract delivery month. The expiration date for Treasury futures is the seventh business day preceding the last business day of the contract delivery month. For Eurodollar contracts, trading ends at 11 a.m. in London, or 5 a.m. Chicago time on the second London bank business day before the third Wednesday of the contract month. As result

of the 5 a.m. expiration time, the last day of trading for Eurodollar contracts listed for trading during the RTH session (regular trading hours, or those designated for open outcry trading) will be the third business day immediately preceding the third Wednesday of the contract month. The settlement date for these contracts is the same as the expiration date.

Commissions

Since well over 90% of all buyers and sellers of financial futures close out their positions by doing an offsetting trade, *futures commission merchants* (FCMs) charge, on an initial buy or sell of futures, a *round-turn* commission: if a customer's initial trade is a *buy*, his FCM charges him a round-turn commission on that buy, but no commission on a later offsetting *sell*.

FCMs used to charge a high minimum round-turn commission; it was phased out with a switch to negotiated commissions. Currently, for institutional investors, the commission on futures contracts ranges from as low as \$5.00 to \$12.50 per round-turn per contract traded. With the advent of electronic trading, costs have been falling in recent years, and FCMs have enabled institutions to trade fixed-income futures directly with the electronic platforms of the CME and CBOT. Commission rates for European fixed-income futures are a bit lower because the fees charged by the LIFFE (London International Financial Futures Exchange) and Eurex are substantially below that of U.S. exchanges. Investors demanding professional sales coverage should be expected to pay more than those who self-execute and assume execution risk.

How the Market Is Made

The market in Treasuries, as noted in Chapter 14, is made by dealers in geographically disperse institutions. Dealers are required to quote bid and asked prices to each other and to retail. They keep in contact through direct phone lines, through various means of electronic communication, and through brokers.

In contrast, in the futures market all trades take place in two venues: the physical trading pits on the floors of the various futures exchanges and via electronic platforms. Electronic trading has made great advances in recent years and is now the more dominant venue. This has weakened the notion that the futures market is a single central market, at least in the physical sense. Nevertheless, the futures market remains a central market

for the matching of buyers and sellers, albeit increasingly in the virtual realm.

Pit Trading

Traders in the futures pits make their bids and offers known by crying them out. This is why trading in the pits is known as *open outcry* trading. In the pit, all that is heard is the highest bid and the lowest offer. Anyone with a lower bid or higher offer remains silent until the market moves to his level. The face-to-face market in the Treasury pits is akin to the market that dealers in cash Treasuries would make if they were jammed in the same physical place shouting and signaling to one another instead of dealing over the phone with brokers.

There are three types of traders in the Treasury pits. First, there are employees of brokerage houses who execute trades for retail customers and for the brokerage house's own account. Many of these brokers also trade for their own accounts; mind you, a broker who does this is required to execute customer business before dealing for his own account. The second type of trader in the pit is the *deck holder*. Deck holders sell a service to brokers; they handle limit orders (e.g., customer orders to buy at 20 when the market is at 22) and stop-loss orders (a customer orders to sell if the price falls to a certain level). A deck holder files all orders given to him by brokers according to price and then, as the market moves, executes those orders he can. Finally, there are private persons (*locals*) in the pit who trade for their own account on an outright speculative basis or more often on a spread basis; an individual who wants to trade futures on the floor of an exchange can do so by buying a seat on the exchange.

A dealer who calls another dealer in cash Treasuries and gets a quote 98-18 can say to the dealer, "You sold Treasuries at 18." He can't do that in the futures market. He can call a broker on the floor and get information on the price at which the last trade occurred and on what bids and offers currently are. But if he asks the broker to execute an order at the current bid or asked price, he can't be sure that the broker will be able to. In a fast market, the five yards from the broker's phone to the pit can be a long way, and the market may have moved by the time the broker signals his order there. Thus, a retail customer has to deal differently with a broker in the futures market from the way he does with a dealer in the cash market if he wants to get orders in size executed. Still, in many futures

markets the liquidity and depth of the markets are sometimes better than that of the cash markets, and orders can be filled quickly and often at a better fair market price during fast markets.

The major dealers are all members of the principal exchanges on which financial futures are traded, and on some of the exchanges they sometimes have two separate desks for trading futures: one to handle trades for house accounts and one to handle trades for customers.

Technically, bids and offers in the futures market do not go subject, which means that price quotes are “subject” to change, when a big number is being announced or when the Fed is in the market. However, futures do not trade through a number, producing what technicians call *gaps*. “For the five-second interval that a number is coming out,” a trader once noted in the late 1980s, “all eyes are glued to the screen. This morning we had a number. Our [cash] markets and the futures markets traded right up to 8:29 [a.m.] and 55 seconds, and they started trading again at 8:30 and 5 seconds. Officially, the futures market has to be open at 8:30 because it never closes [during trading hours] unless it is closed by its board of governors. But, for those 10 seconds, it does not trade because everyone is waiting for that number.” Today, trading occurs right up until the final second before major economic news is released, although the volume during such times often diminishes.

Pit trading has diminished in recent years and now represents only a small fraction of all trading. In the Treasury market, for example, where pit trading was once the only means by which investors could trade Treasury futures, pit trading has become quite sparse relative to electronic trading. On a typical trading day in September 2006, for example, pit trading accounted for just 5% of the total volume of contracts traded in the benchmark 10-year T-note future and about 15% of the total volume in Eurodollar contracts. Interestingly, most of the options volume for both Eurodollars and Treasuries was still taking place in the pits. For Eurodollars, the pit volume for options remained considerably higher than the amount of volume transacted electronically.

Electronic Trading

Electronic trading offers market participants an efficient way of entering orders. Orders are sent directly by the market participant via computer to the electronic marketplaces offered by the various exchanges, thus eliminating the need to go to a broker first and hence speeding up the time it

takes to execute the orders. Brokerage firms are not completely out of the process, as they must first approve their customers for electronic trading and they are also informed of every order that the customer enters. Still, the advent of electronic trading has effectively eliminated the need for brokers in the trading pits, and this trend seems unlikely to change given the penchant for speedy execution of orders. The Chicago Mercantile Exchange estimates that trades entered on its electronic platform are typically completed in a fraction of a second compared to a few seconds to a few minutes for trades entered via open outcry trading.

Aside from speed, one major advantage of electronic trading is the increased transparency of market prices. All of the top five current bids and offers are posted on the electronic trading screens, and these bids and offers are visible to all who access the screens. This gives market participants additional information by which to judge the depth of buyers and sellers at nearby prices.

Market Participants

The principal participants in futures markets are speculators and hedgers. About *speculators* there is little need for explanation: these individuals buy or sell futures contracts in the hope of gain. When futures prices rise or fall sharply, to the dismay of one group or another, the blame is often placed incorrectly on speculators. Actually these much maligned individuals perform a function essential to any futures market; they assume risks that others—including hedgers and arbitrageurs—seek to shed.

There are various types of speculators including scalpers and day traders, for example. *Scalpers* are active traders who seek small but frequent profits. Their activity helps to boost liquidity in the markets. *Day traders* hold positions for longer periods of time than scalpers do, but only during a particular trading session.

Arbitrage is another form of speculation wherein speculators seek out incremental gains from price differences that develop in the same product between different trading exchanges and trading formats. Arbitragers are one reason why any price discrepancies tend to close very rapidly, thus making for more efficient markets.

Hedgers use futures in order to lock in a certain price for the instrument that they want to hedge. For interest-rate products, this could mean locking in a certain return on future cash flows, hedging against the possibility of increased interest costs, or hedging against interest-rate changes that could

affect the performance of various asset classes including mortgage-backed securities and corporate equities, for example.

A portfolio manager who sells Treasury futures to limit the risk on a long position in Treasuries and a portfolio manager who buys Treasury futures to lock in a rate at which he can invest an anticipated cash inflow are both managing risk by *hedging*. To hedge using financial futures is to assume a position in futures equal and opposite to an existing or anticipated position, which may be short or long, in cash or cash securities.

Delivery

An important point to note about hedging through the purchase or sale of either commodity or financial futures contracts is that delivery need not be and usually is not made or taken in connection with a hedge. Normally, hedges and speculative positions as well are closed out by making an off-setting trade in the same contract. Also, as noted, many futures contracts do away with delivery by specifying cash settlement.

The hedger attempts to put himself in a position in which any loss he incurs on his cash position in the commodity (e.g., he is long, and price in the cash market drops) will be offset by an equal gain on his futures position. He can do this by establishing a position in futures and later closing it out. The speculator who neither owns nor desires to own the underlying commodity can also realize whatever gain or loss he makes on his speculation simply by closing out his futures position.

If a hedger, speculator, or other futures market participant wants to make or take delivery, he is—unless cash settlement is specified—free to do so. A trader who maintains an open position in such a market at the expiration of a futures contract must settle by making or taking delivery.

TREASURY BILLS

As was shown earlier in the chapter in Figure 15.1, average daily volume in bill futures fell sharply during the 1980s from its peak in 1982, which was the heyday for the contract. The reasons are several. Today, rates on short-term paper other than bills track Eurodollar rates much more closely than bill rates. Thus, a dealer who keeps core positions in bankers' acceptances (BAs), Eurodollars, and other short paper and who ends up holding some commercial paper now and then gets a better hedge by shorting Eurodollar futures than by shorting bill futures. Also, if he shorts bills futures,

he can react to economic developments or to selling and buying via the Tokyo or London office only during the limited hours that Chicago trades. In contrast, if he shorts Eurodollars, he can adjust his position by trading Eurodollar futures on SGX in Singapore or on LIFFE in London.

Treasury bills are inactively traded contracts. Better put, they almost never trade, although the contracts are still listed at the Chicago Mercantile Exchange. Nevertheless, it is useful in this venue to discuss how T-bill futures can be used as a hedging vehicle, using examples from how they were once more commonly used.

A Long Hedge with No Basis Risk

To illustrate hedging, we consider a few examples. First, a *long hedge* with no basis risk.¹ Suppose that an investor's cash-flow projections tell him that he will have a lot of cash to invest short term in the future; that is, he is going to be *long* investable cash. He can wait to invest until he gets the cash and can take the then prevailing rate, or as soon as his projections tell him how much cash he will have, he can lock in a lending rate by buying bill futures.

Table 15.3 illustrates this. We assume that our investor knows in June that he will have \$10 million of 3-month money to invest in September and that when September arrives, he will invest that money in bills. In June, the September bill contract is trading at 5.25. If our investor buys 10 of these contracts, he will earn 5.25 on the money he invests in September, regardless of the rate at which the cash 3-month bill is then trading.

One way he could get the 5.25 rate would be to take delivery in September of the bills he purchased at 5.25. But to see the nature of the hedge, we assume that, in September when his cash comes in, he closes out his futures position and buys cash bills.

As the September contract approaches maturity, it must trade at a yield close to and eventually equal to the rate at which the 3-month cash bill is trading. If a divergence existed between these two rates as trading in the contract terminated, potential for a profitable arbitrage would exist. For example, if, a few days before the September bill contract matured, it was trading at a much higher yield than the cash bill, traders would buy the contract, sell cash bills on a *when issued* basis, take delivery in

¹ As illustrated in what follows, the outcome of a hedge may depend on how the spread between two rates moves. Depending on the movement, the hedger incurs spread or basis risk.

TABLE 15.3

A long hedge using bill futures: no basis risk; \$10 million face amount

Step 1 (Thursday, third week of June): Purchase 10 September bill contracts at 5.25.

Put up security deposit.

Pay round-turn commission.

Step 2 (Wednesday, third week of September): Sell 10 futures contracts; buy cash bills.

Outcome 1: Cash 91-day bill trading at 5.20

Sell September contracts at 5.20

Delivery value of futures at sale	\$ 9,870,000
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–Delivery value of futures at purchase	<u>9,868,750</u>
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Profit on futures transactions	\$ 1,250
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Buy 91-day cash bills at 5.20

Purchase price of cash bills	\$ 9,868,560
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–Profit on futures transactions	<u>1,250</u>
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Effective price of 91-day bills	\$ 9,867,310
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Calculate effective discount at which bills are purchased:

Face value	\$10,000,000
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–Effective purchase price	<u>9,867,310</u>
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Discount at purchase	\$ 132,690
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Calculate effective discount rate, d , at which cash bills are purchased.

$$\begin{aligned}
 d &= \left(\frac{\text{Discount}}{\text{Face}} \right) \left(\frac{\text{Annualization}}{\text{factor}} \right) \\
 &= \left(\frac{\$132,690}{\$10,000,000} \right) \left(\frac{360}{91} \right) \\
 &= 0.0525 \\
 &= 5.25\%
 \end{aligned}$$

Chicago to cover their short position in the cash bill, and profit on the transaction.²

In outcome 1 (Table 15.3), we assume that, as the September contract matures, the 91-day cash bill trades at 5.20 and the futures contract consequently also trades at 5.20. At this time, our investor sells his

² In practice, maturing bill futures contracts have generally traded during the last few days of their life at a yield a few basis points higher than the deliverable cash. The difference reflects the extra commission and other transaction costs that an investor would incur if he bought bill futures and took delivery instead of purchasing 3-month bills in the cash market.

September contracts and buys the cash 3-month bill. He purchased his futures contracts at 5.25 and sells them at 5.20, a lower rate. Since the delivery value of the contracts is higher the lower the yield at which they trade, our investor makes (Table 15.3) a \$1,250 profit on his futures transaction.

When his profit on futures is deducted from the price at which he buys cash bills, he ends up paying an effective price for these bills that is \$1,250 less than the actual price he pays. And this lower effective price, which is essentially the net price paid, implies that the yield he will earn on his investment is not 5.20, the rate at which he buys *cash bills*, but 5.25, the rate at which he bought bill futures.

Because the prevailing yield at which the cash 3-month bill was trading in September was lower than the rate at which our investor bought bill futures in June, he earned a higher yield, when he invested in September than he would have had he not hedged.

There is, however, a counterpart to this. If in September, the cash 3-month bill were trading at a higher rate than that which prevailed in June, our investor would have lost so many dollars on his hedge that he would have earned a lower return on the money he invested than he could have earned if he had not hedged.

Calculating in Basis Points

It's instructive to work out a hedge example in dollars and cents. However, it's quicker to do it in terms of basis points earned and lost. In our example, the investor buys September contracts at 5.25 and, according to outcome 1, sells them at 5.10. On this transaction, he earns on each contract for \$1 million of bills 15 90-day basis points (bp).³ By buying the 3-month bill at 5.10 and maturing it, he earns 510 90-day bp per \$1 million of bills purchased. So *net* he earns 525 90-day bp per \$1 million of bills purchased, a yield of 5.25 over 90 days.

Actually, the basis points earned on the cash bill are 91-day bp, and those earned on the futures contract are 90-day bp. This difference, however, is not reflected in the numbers in Table 15.3 because it affects yield earned only beyond the third decimal point.

The example we present is a *long hedge* with no basis risk because the investor buys a futures contract for the precise instrument and maturity in which he planned to invest.

³ Recall from Chapter 4 that a 90-day bp is worth \$25 per \$1 million.

A Second Hedge with No Basis Risk

The hedge illustrated in Table 15.3 calls for the investor to *buy* bill futures. Here's a second example in which the investor, to lock in a higher return, *sells* bill futures (this hedge also involves no basis risk). On January 8, 2005, an investor wants to put money into bills for three months. Suppose that he could buy the 3-month bill at 4.20 and mature it. Suppose also that he has a second alternative: Buy the 6-month bill at 4.28 and sell, also at 4.28, the June bill contract, which settles on March 9, 2006. If our investor took the second alternative, he'd know with certainty that he'd earn 4.28 over the three-month holding period, and he'd pick up 8 bp more than he would if he took the first alternative: buy the 3-month bill at 4.20 and mature it. Those extra 15 bp would be worth to him per \$1 million of 6-month bills purchased:

$$8 \times \$25 \times \frac{91}{90} = \$202.22$$

The factor 91/90 comes into the above calculation because our investor would be earning 8 bp on 91-day cash bills.

The trade we have just described is referred to as a *basis trade*. A good question is whether an investor would want to do this trade for such a small yield pickup. Maybe a governments-only money fund that could do futures would want to because it has to be in bills. Other investors with wider parameters would be attracted to this trade if the yield curve were steeper and they could, consequently, get a 20-bp or better pickup in yield. Later, we give, from a slightly different perspective, an example of this trade where rates are such that the yield pickup is much greater.

In both hedge examples we've presented so far, we neglected the small round-trip commission costs our investor would incur on his futures transactions. We also neglected the possibility that he might receive or have to pay out variation margin. If he received variation margin and invested the money thus received, he'd earn a bit more; conversely, if he had to pay out variation margin, he'd earn a bit less.

Hedges with Basis Risk

Hedges are common, but hedges involving *no basis risk* are not. The standardization of futures contracts required for them to be actively traded and

to have liquidity is such that the hedger is normally unable to find a futures position that will give him a perfect offset to his position, actual or desired, in the cash market. Thus, to use futures, he must settle, if you will, for a ready-made rather than a tailor-made suit; and often, he will willingly do so for good reasons: the ability to strike a trade, the liquidity of the position he assumes, and the protection against risk of default that dealing on a futures exchange affords him.

Often, a hedger using financial futures will find that the hedge he establishes carries basis risk for one or both of two reasons: (1) the contract's settlement date does not match precisely the time horizon in which he anticipates dealing (e.g., he fears that interest rates might decline, and he wants to lock in a rate at which he can buy bills in May, a month in which no bill futures contract settles); or (2) he wants to hedge a position, actual or anticipated, in a security other than the deliverable security (e.g., he sells bill contracts to hedge a position in BAs or some other money market paper). Hedging a position in one security by assuming a futures position in a different but similar security is known as a *cross hedge*.

The precise outcome that a hedger will attain from a cross hedge is always clouded in some degree of uncertainty. How closely his gain (loss) on futures will track his loss (gain) on his cash-market position will depend on how the spread (basis) between the rate on the futures contract he's using and rate on the instrument he's hedging changes over the life of his hedge.

When a hedge carries basis risk, the hedger shifts the nature of his speculation from a speculation on a rate level to a speculation on a spread: he assumes basis risk. He does so because he believes, generally with good reason, that the uncertainty of the outcome generated by spread risk will be substantially less than rate level risk (i.e., general market risk) to which he would have been exposed had he not hedged.

Example of a Cross Hedge and the Resulting Basis Risk

We can illustrate the basis risk that arises from a cross hedge by changing several assumptions in our second example of a hedge (buy 6-month bills and sell bill futures that settle precisely three months hence). Suppose our investor wants to invest in BAs for three months and faces the following alternatives: (1) he can buy domestic, 3-month BAs at 4.625; or (2) he can buy domestic, 6-month BAs at 4.67 and sell 3-month bill futures at 4.28. At the moment he makes his choice, 3-month bills are trading at 4.24, that is, BAs are 39 bp cheap to bills. If that spread were to stay constant,

our investor, by taking alternative 2 rather than alternative 1 would earn an extra 4.5 90-day bp, each worth \$25 per \$1 million.

However, the BA-bill spread is not written in stone. Another scenario could occur: either a financial or other kind of event occurs that drives up demand for liquid instruments, especially bills; that in turn drives the 3-month bill rate down to 4.165 but has no impact on the 3-month BA rate. Under this second scenario, our investor must, at the end of three months, buy back at 4.165 the 3-month bill futures he earlier sold at 4.24; doing so gives him a loss on his position in bill futures of 7.5 90-day bp:

$$4.165 - 4.24 = -0.075 = -7.5 \text{ bp}$$

At the same time, our investor sells his 6-month BAs, after holding them for three months, at the unchanged 3-month BA rate of 4.625. By being in 6-month BAs rather than in 3-month BAs, our investor has picked up 5 90-day bp,

$$4.675 - 4.625 = 0.05 = 5 \text{ bp}$$

but he's lost 7.5 90-day bp on his position in bill futures. Thus, net, by choosing a cross hedge over a straight investment in 3-month BAs, our investor has lost 2.5-day bp, or \$62.5 per \$1 million of BAs bought. In this example, our investor took on *basis risk* and put himself in the position where a widening of the BA-bill basis in the 3-month area would lower his net return. That is precisely what happened.

It might be argued that no investor is going to get involved in the above trade in the hope of picking up a mere five 90-day bp or that our investor would have done better to hedge using Eurodollar futures. Both points may be well taken. However, our purpose was simply to illustrate the nature of basis risk in a cross hedge, and our example—regardless of its realism—does that.

Also, one can imagine circumstances in which the above trade would be more attractive to an investor. The yield curve in the 3- to 6-month area is *steeper*; so our investor gets a bigger yield pickup by extending from a 3- to a 6-month maturity. In addition, our investor might reason, "The dollar is strengthening, so *the spread of BAs to bills should narrow*, which will add to my profit on the trade." That's speculating on the basis with the hope of profiting from a favorable change in the basis.

A Cash-and-Carry Trade with No Basis Risk

So far we have considered examples in which an investor with cash to invest uses bill futures as a tool to hedge absolute rate risk. There are also

various arbitrages that dealers and spec accounts can put on using bill futures that require the arbitrageur to put up little or no cash; basically, such trades, depending on their complexity, constitute a bet on one or more rate spreads.

A trade that is done in bill futures in huge volume when rates are right and that tends to link rates on cash and futures bills is one that has been dubbed the *cash-and-carry trade*. This trade could be done by many investors, but it is most commonly done by professional speculators and large dealers, who watch the relationship among cash, futures, and term repo rates and put on this trade in size whenever that relationship makes the trade profitable.

For a leveraged investor, an attractive tactic is to buy a cash bill, finance it with term repo, and cover the rate risk on the resulting tail by selling that tail in the futures market.⁴ Whether doing so will be profitable depends on the relationship among the term repo rate, the rate on the long cash bill, and the futures rate. There must be some term repo rate at which a dealer who does the above transaction will just break even; this break-even *rate* has been dubbed the *implied repo rate*. Whenever the prevailing repo rate is less than the implied repo rate, putting on a cash-and-carry trade yields a profit.

In the flat yield curve environment that prevailed in early 2006, the cash-and-carry trade was unprofitable, so to illustrate it, we use rates that prevailed in an earlier period when the interest-rate environment was much different and when liquidity in T-bills was at its peak. The example is important because it introduces a widely used concept, the implied repo rate, which we encounter again in Chapter 16.

On October 28, 1982, the March 24, 1983 bill, which was the deliverable bill for the December 1982 bill futures contract, was trading at 8.26. On the same day, the December bill contract, which expired 56 days hence, was trading at 8.28.

The repo rate is an add-on, 360-day rate. Thus, to calculate the implied repo rate on a cash-and-carry trade based on the above cash and futures rates, one must calculate the holding period yield (HPY) on a 360-day basis that an investor could have earned if he had bought the March 24, 1983 bill at 8.26 and simultaneously sold that bill at 8.28 for delivery 56 days hence in the futures market.

That calculation, worked out in Table 15.4, shows that holding period yield—the implied or break-even repo rate—was 8.51.

⁴ The concept of tails and how they are created is discussed in Chapter 10.

TABLE 15.4

Calculating the implied repo rate which equals the holding period yield earned on a 360-day basis on the bill

Step 1: On October 28, 1982, purchase \$1 million of the March 24, 1983 bill at 8.26.

$$\begin{aligned}\text{Purchase price} &= (\$1,000,000)(0.0826) \left(\frac{147}{360} \right) \\ &= \$966,271.67\end{aligned}$$

Step 2: On March 28, 1982, simultaneously sell the December 1982 bill futures contract at 91.72, which corresponds to a yield of 8.28.

$$\begin{aligned}\text{Sale price} &= (\$1,000,000)(0.0828) \left(\frac{91}{360} \right) \\ &= \$979,070.00\end{aligned}$$

Step 3: Calculate holding period yield (HPY), which equals the *implied repo rate*.

$$\begin{aligned}\text{HPY} = \text{implied repo rate} &= \left(\frac{\text{Sale price} - \text{Purchase price}}{\text{Purchase price}} \right) \left(\frac{\text{Annualization}}{\text{factor}} \right) \\ &= \left(\frac{\$979,070.00 - \$966,271.67}{\$966,271.67} \right) \left(\frac{360}{56} \right) \\ &= 0.0851 = 8.51\%\end{aligned}$$

Had the actual term repo rate for a 56-day repo been 8.25 on October 28, 1982, then by buying the March 24, 1983 bill, financing it for 56 days at 8.25, and selling the resulting tail in the futures market at 8.28, a trader could have picked up \$3,908.03 per \$10 million of the trade he put on (Table 15.5).

Comparing the 8.25 term repo rate with the 8.51 implied repo rate suggests that this trade offers a locked-in profit of 26 bp on the amount invested for 56 days. In fact there are a few slips twixt the cup and the lip: a few things that might or will happen to alter the spread earned on the trade. First, a small commission must be paid on the futures trade.

Second, if bill rates rise sharply over the holding period, variation margin in the form of investable dollars will be paid into the trader's margin account, which—assuming he invests these dollars—will raise his return on the trade. Our trader's 26-bp profit spread would conversely be threatened by a rally in bills, which would result in margin calls that he would have to meet in cash. How much of a threat do potential margin

TABLE 15.5

Calculating the profit on a \$10 million cash-and-carry trade if rates were those shown in Table 15.4 and the term repo rate were 8.25

A: Formula:

$$\text{Profit} = (\text{HPY} - \text{term repo rate}) (\text{Amount invested}) (\text{Fraction of year invested})$$

B: Profit calculation:

$$\begin{aligned} \text{Profit} &= (0.0851 - 0.0825)(\$9,662,716.70) \left(\frac{56}{360} \right) \\ &= \$3,908.03 \end{aligned}$$

calls pose to our trader? Relatively little. Even in the unlikely event that bills rallied by 100 bp on the day the trade settled (October 28, 1982), the extra margin he would have to put up over 56 days would, assuming a 8.25 financing rate, cost him only 2¼ bp of his profit spread.

A third factor that might marginally affect the profit earned by our trader is the price at which the March 24, 1983 bills and the December bill futures contract *converge* at expiration of the futures contract. The bill futures contract is for \$1 million of a 90-day bill on which a basis point is worth \$25. The deliverable bill is in fact a 91-day bill on which a basis point is worth \$25.2777 per million. The trade thus calls for selling bills on which a basis point is worth \$25 and delivering bills on which a basis point is worth \$25.2777. If the convergence price on the trade is below the price level at which the trade is put on (i.e., if rates rise), the trader will have lost some of his profit because he will have lost on his cash position basis points worth \$25.2777 while gaining on his futures position a *like amount* of basis points worth only \$25.

Much can be made of *convergence-price risk*, but in fact if the cash and futures prices converged by 100 bp above the price level at which the trade was put on, the trader would lose only two of his 26 bp profit margin on the trade. Alternatively, if cash and futures converged at a price level well below that at which the trade was put on, the trader would add a couple of basis points to his profit margin on the trade.

A final factor affecting profit on the trade is transaction costs—back-office costs or whatever. Usually, these are so small that no one bothers to incorporate them into return calculations.

To sum up, a trader putting on a cash-and-carry trade does not lock in a certain rate of return. However, on a short trade of the sort illustrated, even a 20% rise in bill prices, which would be unheard of these days, would leave most of his profit intact.

We have been talking about the signal that the relationship between the implied repo rate and the actual term repo rate gives the leveraged trader. The strictly cash investor who is investing money into December also gets a signal from the relationship between these rates. If the implied repo rate *exceeds* the term repo rate, then the cash investor will earn more by investing in the long bill and selling December futures than he would by investing in term repo and probably more than he would by investing in the bill maturing at expiration of the futures contract. If, alternatively, the reverse is true and the leveraged cash-and-carry trade (Tables 15.4 and 15.5) is unprofitable, the short-bill trade offering the cash investor the highest return would probably be to buy the 56-day December bill and mature it.

An Unleveraged Cash-and-Carry Trade

In an example above, we noted that, for a cash investor wanting to invest short term, the structure of rates is at times such that his holding period yield will be greater if he does a cash-futures trade—buys a longer bill, sells the nearby futures contract, and makes delivery—than if he does a strictly cash-market trade: buys the short bill and matures it.

Table 15.5 illustrates such a situation: By doing the cash-futures trade, an investor, faced with this rate matrix, can pick up 95 bp more in yield than he would have if he had operated strictly in the cash market—bought the short bill and matured it.

Note that the 95-bp yield pickup is not carved in stone. All the factors that we said would or might affect the outcome of the trade described in Tables 15.5 and 15.6 come into play in this example too. Futures commissions will reduce the yield pickup slightly. Also, a rally in the bill market will cost the investor a few basis points of his yield pickup both because of margin calls and because of the cost implied by the convergence of cash and futures prices at a higher level. These factors, even if they all work to lower yield pickup, are, however, too small to alter the fact that this is a productive, attractive trade for the alert cash investor.

TABLE 15.6**An unleveraged cash-and-carry trade: no basis risk****Strategy A:** Buy long bill, sell futures, and make delivery.

1. Buy, on November 15, 1982, at 8.43, \$1 million of the March 24, 1982, bill, which matures in 128 days.

$$\begin{aligned}\text{Purchase price} &= (\$1,000,000) \left(1 - \frac{0.0843 \times 128}{360} \right) \\ &= \$970,026.67\end{aligned}$$

2. Simultaneously sell, on November 15, 1982, \$1 million of December 1982 bill futures at a price of 91.76 (8.24 yield).
3. On December 21, 1982, deliver the March 24, 1982 bill, the current maturity of which is now 91 days, against the December futures contract, which is assumed to settle at 91.76.

$$\begin{aligned}\text{Sale price} &= (\$1,000,000) \left(1 - \frac{0.0824 \times 91}{360} \right) \\ &= \$979,171.11\end{aligned}$$

4. Calculate rate of return on purchase and resale

$$\begin{aligned}\text{Rate of return} &= \left(\frac{\text{Sale price} - \text{Purchase price}}{\text{Purchase price}} \right) \left(\frac{\text{Annualization}}{\text{factor}} \right) \\ &= \left(\frac{\$979,171.11 - \$970,026.67}{\$970,026.67} \right) \left(\frac{360}{37} \right) \\ &= 0.0917 = 9.17\%\end{aligned}$$

Strategy B: Buy short cash bill and hold to maturity.

1. Buy, on November 15, 1982, at 8.15, \$1 million of the December 21, 1982 bill which matures in 37 days. Hold the bill until maturity.

$$\begin{aligned}\text{Purchase price} &= (\$1,000,000) \left(1 - \frac{0.0815 \times 37}{360} \right) \\ &= \$991,623.61\end{aligned}$$

2. Calculate the rate of return on holding bill to maturity

$$\begin{aligned}&= \left(\frac{\$1,000,000 - \$991,623.61}{\$991,623.61} \right) \left(\frac{360}{37} \right) \\ &= 0.0822 = 8.22\%\end{aligned}$$

Calculate the yield pickup by doing Strategy A, not Strategy B:

$$\begin{aligned}\left(\begin{array}{l} \text{Yield pickup from} \\ \text{doing A, not B} \end{array} \right) &= 9.17 - 8.22 \\ &= 0.95 \\ &= 95 \text{ bp}\end{aligned}$$

On a \$10 million trade, the extra return earned would be:

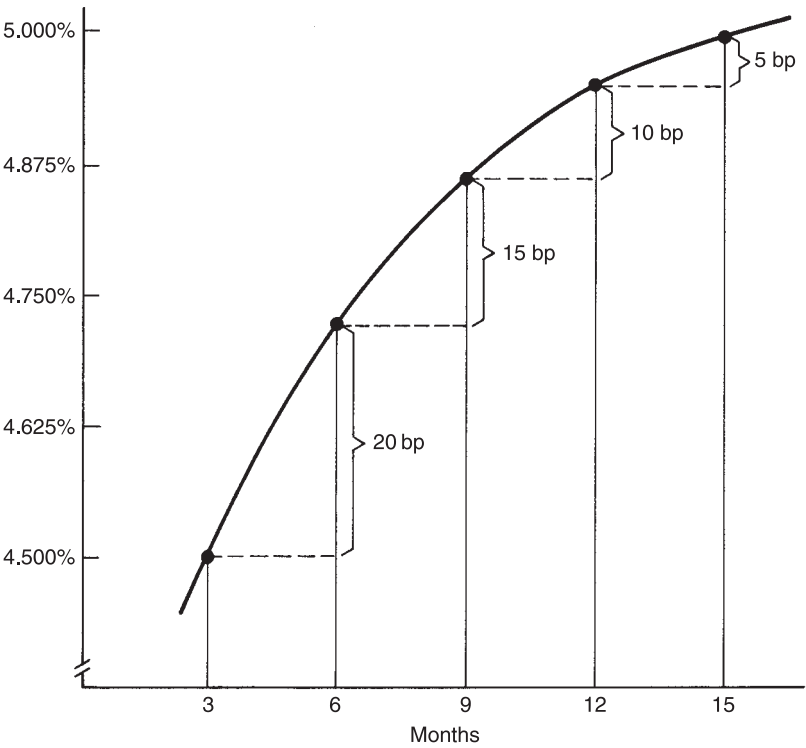
$$(0.0095) \left(\frac{37}{365} \right) (\$10,000,000) = \$9,630$$

Spreading

A hedger is typically shifting his risk from a speculation on rate levels to a speculation on spread variation. A speculator with no position in cash or cash securities to hedge can also speculate on spread variation. Such speculation, which is referred to as *spreading*, calls for the trader to short one contract and go long in a neighboring contract on the expectation that the spread between the two contracts will either narrow or widen. Here's an example. In normal markets, the yield curve is steep at its base and then gradually flattens. Suppose, for illustration, that, in the futures market, the yield curve has the shape shown in Figure 15.2.

FIGURE 15.2

Yields on bill futures contracts expiring in 3 to 15 months



The yield spread between the two contracts nearest maturity is 20 bp; there are 15 bp between the second and third contracts, 10 between the third and fourth contracts, and 5 between the fourth and fifth contracts. The spreader assumes that, as the more distant contracts approach maturity, spreads between them will widen. Given this expectation, he might short the contract maturing in 12 months and buy the contract maturing in 9 months. If, over the next 6 months, the spread between these contracts widened from 10 to 20 bp, he would be able to close out his position at a 10-bp profit.

He earns a profit because, if the spread widens, the price of the futures contract in which he has a long position will rise in value relative to that in which he has a short position. Whether yields rise or fall over the holding period is immaterial to whether he profits or not. What counts is that the spread widens. His principal risk of loss is thus that the yield curve will flatten (or invert) so that the spread between the contracts that he's long and short will narrow (or turn negative) rather than widen.

Spread traders are an important and permanent component of futures pits. A spreader who sees selling in the March contract but knows that there is a bid in the Junes will buy the Marches, sell the Junes, wait until the pressure is off the Marches, and then turn the position around. Spreaders account for a significant part of trading in the longer contracts. In doing trades of the above sort, spreaders perform an important market function—they provide liquidity to the longer (back) contracts.

Curve Trades or Calendar Spreads

A dealer's *curve trader* might use futures to put on a bet as to how the shape of the yield curve will change—a trade that's also called a *calendar spread*. To illustrate, suppose that a dealer reasoned, "The economic environment is such that it's a good bet that the short end of the yield curve is going to invert even further." Then his curve trader might buy the December 2005 contract at 4.39 and sell the March 2006 contract at 4.34—betting that the spread between the two would widen. Because of the illiquidity of the back bill contracts, to get into the March 2006 contract, the curve trader would surely have to do a spread trade, in bills or Eurodollars to bills, and then close out the leg of that spread trade that he did not want to hold. From the point of view of liquidity, the Eurodollar contract is far more attractive for doing curve trades.

Bill Futures: A Dying Contract?

Aside from a complete lack of liquidity, a second problem with bills futures is that the contract has been squeezed on several occasions. The fact that the deliverable bill is a reopening of an old bill does not really help much. Bills have a tendency to get put away, and only a portion of the new supply coming to market just before settlement of a bill futures contract actually gets to the Street. Many of these, for example, are tucked away in money market mutual funds. With so few securities available for delivery, it's difficult for there to be a viable market for bills futures. The game would go like this: when a bill contract settles, shorts will be unable to get their hands on deliverable bills; fails to deliver will occur; and so long as these fails last, the squeezer—who's long unsettled bill futures—will earn the bill rate on bills he hasn't yet had to pay for.

The problems we've mentioned have discouraged people from trading bill futures, leading to a decrease in the liquidity of the contract; this has in turn further decreased the attractiveness of the contract to hedgers, curve traders, and others.

The risk of a future squeeze in the bill contract could be eliminated by rewriting this contract with provision for cash settlement. However, the Chicago Mercantile Exchange has not made this change, despite the lack of trading in bill futures. Thus, there's no development in sight that seems likely to stem the lack of interest in the trading of bill futures.

THE EURODOLLAR FUTURES CONTRACT

For the many banks, domestic and foreign, that operate in the Euromarket, LIBOR has long been the marginal cost of funds. In addition, because of the reserve status of the U.S. dollar, many entities worldwide have conducted a large number of their transactions in dollars and have dollars deposited in commercial banks outside the United States. These deposits are known as *Eurodollars*.

Over two decades ago the widespread use of LIBOR (London Interbank Offered Rate) as a reference rate for dealing in Eurodollar deposits led many to think that a Eurodollar futures contract had the potential to be the most widely used and traded of all financial futures contracts; consequently, futures exchanges were eager to introduce one. Finally, in the spring of 1982, the IMM was authorized by the CFTC to begin trading a futures contract for 3-month Eurodollar deposits. LIFFE, when it opened

in September 1982, introduced a similar contract for 3-month Eurodollar time deposits.

The Eurodollar time-deposit contract introduced by the IMM resembles the bill contract in that it is also for \$1 million of a 90-day instrument. Also, like the bill contract, the Eurodollar contract can be used in a wide array of trades: to put on long and short hedges, to create synthetic securities, to put on spread trades, and to do an ever-expanding list of arbitrages. However, the two contracts differ in that the IMM Eurodollar contract provides for cash settlement.

Given the heterogeneity of bank credits and the tendency of investors to overreact to any problems, even temporary, that a bank may experience, a futures contract for money that banks buy (i.e., for deposits at different banks) might well have fared no better than the failed domestic CD contract had not its originators insisted on cash settlement.

The idea of cash settlement on a futures contract had been around for a long time, but until the introduction of the IMM Eurodollar contract, it was never incorporated in any futures contract. Those opposed to cash settlement of a futures contract argued either that such a contract was suspiciously close to gambling or that a mechanism for delivery of the commodity or instrument underlying the futures contract was required to ensure convergence of cash and futures prices. Those favoring cash settlement saw it as a means to create a viable futures contract in an instrument on which delivery would be difficult or impossible to effect smoothly. They also saw cash settlement as the simplest of innovations to introduce.

Thus, the IMM proposed and the CFTC accepted a futures contract for a 3-month Eurodollar time deposit with the settlement price (100 minus yield) being established off 3-month LIBOR quotes prevailing in London on the day of settlement. By authorizing cash settlement on the IMM Eurodollar contract, the CFTC, in its role as federal regulator of futures markets, overcame a practical barrier that had existed to cash settlement of futures contracts: by its action, it preempted state gaming laws under which a futures contract providing for cash settlement might have been judged to be an unenforceable gaming contract.

Gaming laws also exist in the United Kingdom and other countries. Because of them, LIFFE opted for a Eurodollar time-deposit contract with provisions for delivery at settlement of the contract or optional cash settlement. In doing so, LIFFE had little choice. U.K. futures markets are regulated informally by the Bank of England, which lacked the power,

even if it had chosen to do so, to take any action that would have insulated a futures contract providing for cash settlement from U.K. gaming laws.

Initially, the IMM Eurodollar contract got off to a slow start, but it has since grown into the most active futures contract in the world, when measured in terms of open interest. As with the bill and bond contracts, the entry of natural end users into the new market was initially slowed—in some cases temporarily precluded—by various constraints: regulatory dictates on what different classes of institutions—banks, thrifts, insurance companies, and others—might and might not do, accounting practices that caused successful hedges to threaten desired earnings stability, and lack of expertise.

From the outset, the IMM contract had several crucial advantages over the LIFFE contract. First, the IMM contract was traded near the bill pit, which encouraged a natural low-risk trade to get volume in Eurodollars going—spread trades between the bill and Eurodollar contracts. Also, the IMM had the advantage of having an active body of locals that was accustomed to trading financial futures and keen to take on a new one; LIFFE lacked such locals and the liquidity that trading by locals immediately gave to IMM Eurodollar contract.

Over time, the CME's Eurodollar contract became a fantastic success, rivaled in the U.S. markets only by the CBOT's Treasury futures contracts. In November 2005, 28 million CME Eurodollar contracts were traded and open interest totaled a record 9.5 million contracts, equal to \$9.5 trillion in notional value. Eurodollar options were also active in November 2005, trading 15 million contracts. By comparison at the CBOT, 5.6 million financial futures traded, consisting mostly of Treasury futures plus the CBOT 30-day federal funds futures. The notional dollar value traded daily was also substantially higher for Eurodollar contracts because each Eurodollar contract has a notional value of \$1 million compared to \$100,000 for each Treasury contract.

Trading in contracts for most other financial futures pales when compared to trading in Eurodollars. One measure of the strength of the CME Eurodollar is the number of periods for which it is actively traded and the fact that liquidity exists not just in the front contracts. Currently, the Eurodollar contract goes out 10 years, and there is typically meaningful open interest 5 years out. For example, in September 2006 the open interest on the December 2011 contract was about 22,000 contracts. Open interest was 100,000 contracts or more for all contracts expiring in the forthcoming four years. By comparison, there was no open interest in

Treasury futures expiring a year ahead, and the open interest in federal funds futures was insignificant beyond six months ahead. This is one reason why Eurodollar contracts are a useful tool for gauging sentiments regarding future changes in monetary policy.

A Eurodollar contract is also traded on the *Singapore Futures Exchange (SGX)*, which was formerly known as the Singapore International Monetary Exchange (SIMEX). The SGX and CME Eurodollar futures contracts are fungible via the *mutual offset system (MOS)*, which allows for interexchange transfers of eligible futures contracts, a big convenience to round-the-clock traders. The LIFFE and CME Eurodollar contracts are not fungible; however, prices on the two exchanges track each other closely, since the contracts traded are so similar. The open interest on the SGX Eurodollar contract stood at about 80,000 contracts in September 2006. For the LIFFE Eurodollar contract, open interest was similar.

Trading Hours

Trading in Eurodollar futures used to start at the civilized—for Chicago traders—hour of 9 a.m. New York time when the cash-market trading opened before it essentially became a 24-hour market. At that time, the Treasury and other departments tracking important numbers adopted the practice of announcing many of those numbers at 8:30 a.m.—the idea being to give the market time to absorb the numbers before it opened. In fact, what happened is that people started to trade earlier: cash in New York or London and Eurodollar and Treasury bond futures on LIFFE in London. Thus, on early-number days, the half-hour or more before Chicago opened provided a great window of opportunity for LIFFE, which often saw more trading during this period than during the rest of its day. Responding to the business being lost to LIFFE, the IMM and the CBOT moved up the opening of trading on the bill, Eurodollar, and bond futures contracts to 8:20 a.m.

With the advent of electronic trading, the Eurodollar contracts now trade virtually around the clock. Pit trading begins at 8:20 a.m. New York time and ends at 3 p.m. Electronic trading hours overlap with pit trading hours beginning at 6 p.m. each weekday, running through the next day until 5 p.m. On Sundays, electronic trading also begins at 6 p.m. In other words, during weekdays, Eurodollar contracts trade electronically every hour but one—from 5 p.m. until 6 p.m., with the exception of Friday when there is no trading after 5 p.m.

SGX opens at 7:45 p.m. New York time and runs until 6 a.m., four hours after London opens its Eurodollar contracts, which trade for 16 hours until 4 p.m. So, the only real gap during which Eurodollar futures cannot be traded occurs when the CME shuts its contracts for trading between 5 p.m. and 6 p.m. Liquidity can of course differ during the hours that Eurodollar contracts trade: it is not just a matter of what hours trades can be transacted, but of the size that can be done at a given hour.

Hedging

It's easy to take the Eurodeposit market curve and calculate from it implied Eurodollar forward rates for periods that match the CME contract periods. Comparing such rates to actual CME rates, one finds that Eurodollar contracts typically trade a little cheap to (at a higher yield than) the corresponding implied forwards. One reason is that dealers in money market instruments, which can't easily be shorted, use Eurodollar futures to hedge. A dealer in commercial paper, BAs, Eurodollar CDs, and other short paper is always long inventory, and if he fears that the market is going down, the natural thing for him to do is to sell Eurodollars; however, if he thinks that the market is going up, he doesn't buy Eurodollars; he buys inventory.

As noted earlier and below, dealers sell Eurodollars to hedge not just money market inventory that they hold, but interest-rate swaps that they warehouse, interest-rate caps that they write, and other exotics as well. Credit borrowers sell Eurodollars to hedge forward borrowing rates, particularly when the contractual borrowing rate is linked to the LIBOR, which reflects the 3-month Eurodollar rate. In this case, the borrower can lock in the forward borrowing rate by selling Eurodollar contracts.

For example, suppose in December a borrower expects to borrow \$10 million on March 16 of the following year and that the contractual loan rate will be 1.5 percentage points over the 3-month Eurodollar rate (LIBOR) on that date. Assume that LIBOR is currently trading at 4.50% and that the March Eurodollar contract is trading at 95.25, implying a forward Eurodollar rate of 4.75% ($100.00 - 95.25$). In selling 10 March Eurodollar contracts, the borrower can lock in a borrowing rate of 6.25% for the 3-month period beginning March 16, reflecting the implied forward rate plus the contractual loan add-on of 1.5 percentage points. If he does, he will have created a synthetic fixed-rate loan.

On the other side of the ledger, banks use Eurodollars to lock in funding rates against loans the banks issue. For example, many banks fund

themselves with 3-month Eurodollar time deposits. When these banks lend money beyond three months they face rollover risk that could result in losses on the loans they issue. To ensure a profit, they must lock in their funding rates, and they can do so by selling Eurodollar contracts in each of the quarterly contracts that exist during the term of the loan with the exception of the quarter in which their funding rates are already locked in. For example, a bank that wants to hedge itself against the issuance of a 1-year loan could sell a “strip” of Eurodollar contracts for the nine months that its funding costs must be hedged against (nine, because in this example the funding rate for the first three months is ensured by the receipt of a 3-month Eurodollar time deposit). If the bank is lending \$10 million, this means that it will need to sell 10 Eurodollar contracts in each of the three quarters that it faces rollover risk.

Liquidity

“The Eurodollar futures market is,” in the words of one trader, “an amazing market—extremely liquid.” It is very easy to get in and out at any time at as little as one tick, or a half basis point. Liquidity is deepest in the electronic market, where over 80% of all trades take place, so that is where institutional investors go when they want to fill large orders.

Literally thousands of contracts are typically on the bid and offer sides of the most actively traded Eurodollar contracts. Even when prices change rapidly, the market remains deep on both sides.

The deep liquidity of the Eurodollar market is very much connected to the substantial financial innovation that has taken place over the years. The mortgage-backed securities market is one example: It has grown to become the largest segment of the bond market, accounting for \$6.2 trillion of its \$26.4 trillion size at the end of June 2006, according to data from the Bond Market Association. Many mortgage originators, investors, and the like that have exposure to the mortgage market often use Eurodollar contracts to hedge their positions, as do others wanting to hedge against an existing or future interest-rate risk. Another source of volume has been the swaps market, which uses Eurodollar futures to help convert floating interest-rate exposures to fixed rate ones, and vice versa. At the end of 2005 the notional value of over-the-counter interest-rate swaps outstanding was \$173 trillion, according to data from the Bank for International Settlements (BIS) in its quarterly review dated June 2006. Interest-rate swaps represented a large portion of the \$215 trillion in interest-rate derivatives

outstanding and of the \$285 trillion in the total amount of over-the-counter derivatives contracts outstanding.

Calendar Spreads in Eurodollars

For a speculator who does not particularly like to take outright positions in the market but likes to trade relative values between calendar months, the Eurodollar contract is also excellent. After the front contracts, which consist of the four quarterly contracts plus the four nearest serial months, come four *red* contracts and then four *green* contracts, as they are called. The colors provide traders with a simple way to identify contracts that expire during the 10 years for which there are Eurodollar contracts. In Eurodollars, there is good liquidity in the front contracts and in the reds, but it starts to thin out in the greens and the *blues* (Table 15.7).

On a spread spanning several quarters, or perhaps a year or more, a trader can make or lose lots of money. Here's an example. Starting in late 1999,

TABLE 15.7

Open interest in Eurodollar futures contracts on
September 6, 2006

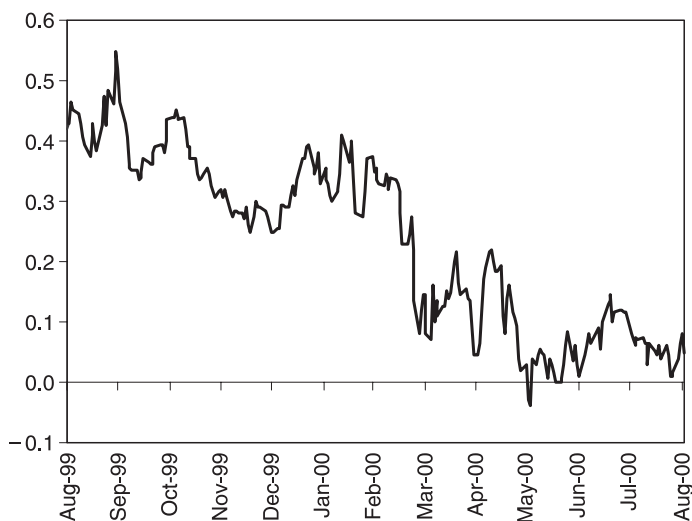
Month	Color Code	Open Interest
September 2006	White	1,379,329
December 2006	White	1,617,109
March 2007	White	1,323,788
June 2007	White	1,075,157
September 2007	Red	1,127,028
December 2007	Red	965,626
March 2008	Red	642,873
June 2008	Red	436,909
September 2008	Green	318,773
December 2008	Green	313,097
March 2009	Green	292,556
June 2009	Green	208,757
September 2009	Blue	142,587
December 2009	Blue	120,944
March 2010	Blue	102,523
June 2010	Blue	104,070

the yield curve, which had a positive slope, got progressively flatter and moved toward inversion in early 2000, inverting briefly along some parts of the curve. One would have expected Eurodollars to follow a similar pattern, with the differential between the implied yields on the front contracts narrowing versus the implied yields on back contracts, particularly after the Fed delivered its last interest-rate hike in May 2000 for the cycle begun in 1999. Implied yields began to narrow (Figure 15.3), and they did so again when the yield curve began flattening again in late 2003 after a return to a very positive slope following the deep interest-rate cuts implemented by the Federal Reserve beginning in 2001. The yield curve got progressively flatter, and the flattening accelerated in 2004 and 2005 until parts of the curve inverted briefly late in 2005 and again in 2006.

Two things caused the Eurodollar futures curve to flatten sharply. First, in the whole market, the yield curve flattened and then inverted. Second, some special factors were driving spreads. One was interest-rate-swap activity. Suppose a dealer does a big 3-year interest-rate swap and warehouses it while he looks for people wanting to take the other side;

FIGURE 15.3

Differential between the implied yield on the December 2000 Eurodollar contract and the December 2002 Eurodollar contract (in percentage points)



the swap puts the dealer temporarily at risk; and to hedge, he's likely to sell a 3-year *strip* of Eurodollars if his customer swapped a floating rate to fixed rate or to buy a 3-year strip of Eurodollars if his customer swapped the other way (for swaps, see Chapter 19).

As mentioned earlier, such hedging is a large source of demand and supply in Eurodollar futures. At times, it can cause spreads to get out of line, albeit briefly, because the open interest is lower in the back contracts than in the front contract. In December 2005, the open interest in the March 2006 contract was 1.124 million contracts, while in the March 2008 contract it was a relatively smaller 245,000—not an insignificant number itself but small enough that a very large transaction could have mild impact on its spread to the front contract.

In that sort of environment, a big leveraged buyout (LBO) deal that generates a huge amount of floating-rate debt can affect for a time Eurodollar futures spreads. The borrower might hedge directly his interest-rate risk by selling a big strip of Eurodollar futures, or he might do a huge interest-rate swap, floating to fixed, with a dealer; if he did the latter, the dealer would be selling a strip of Eurodollars to hedge.

Suppose that either way a deal results in the selling of a large strip of Eurodollars. That size won't affect the front contract, but it's going to double the back contract or take it all away. Thus, hedging a huge swap can affect prices in the back contracts.

If the borrower has done a swap with a dealer who hedges by selling a strip of Eurodollars, later as the dealer is able to find the other side of the swap, he will buy back, a bit at a time, the Eurodollar strip he previously sold. So first there's a big flow one way, and then a flow the other way. The front contract absorbs this nicely, but the back contracts several years out don't absorb the volume as well as the front contract can. Nevertheless, there is a very liquid market in Eurodollar contracts expiring in the first few years, so any impact on prices tends to be limited and also short-lived given the efficiency of the markets.

Another thing that a Eurodollar curve trader must keep an eye on is activity in interest-rate caps (Chapter 17). A big LBO borrower who's taken on a lot of floating-rate debt might reason, "I can live with rates going to 8%, but after that I want to be capped out." A dealer will write such a cap, but doing so puts him at substantial risk. He can hedge by buying Eurodollar put options, but maybe the dealer thinks they are too expensive, and anyway he could trade them in size only for the front three, maybe four, months. If so, the dealer might opt merely to implement a delta hedge. If the dealer's

option starts at the money, his hedge ratio is 50%, which means that for \$10 million of options, he needs to short a \$5 million strip of Eurodollars.

Most of these delta hedges are started in the front contract (and later rolled) because the front contract is so liquid that dealers can do huge size in it. If the market goes down (i.e., if rates rise) while dealers have delta hedged a lot of caps, their delta hedges will call for them to sell yet more Eurodollars just to maintain those hedges, and that will impact spreads. A large move in the front Eurodollar contract that occurs without similar movement in the back contracts could be the result of delta hedging. It's similar to portfolio insurance: there are additional buyers when the market goes up and additional sellers when the market goes down.

Bundles and Packs

The widespread use of Eurodollar futures often entails the purchase and/or sale of more than one quarterly Eurodollar contract. The more frequent use of such transactions led to the emergence of markets for trading in strips of Eurodollar contracts.

Eurodollar *bundles* were introduced by the Chicago Mercantile Exchange in September 1994. A Eurodollar bundle is the simultaneous purchase or sale of a consecutive series of Eurodollar futures in equal proportions beginning usually with the front quarterly contract, although since October of 1998, bundles were allowed to be constructed starting with any quarterly contract. Bundles enable a strip of contracts to be traded in a single transaction. Bundles are utilized by many types of investors including commercial banks, which seek to hedge their interest rate risks. Investors who frequently bet on the yield difference between Treasury and Eurodollar rates are also active users of bundles.

A 1-year bundle consists of the first quarterly Eurodollar contracts; the 2-year bundle consists of the first eight quarterly contracts; the 3-year bundle consists of the first 12 quarterly contracts, and so on as far out as 10 years. In addition, there is a 5-year *forward bundle* that consists of years 5 through 10 of the Eurodollar futures strip.

Bundles are quoted in terms of net change during the current trading session compared to the previous day's settlement level. In other words, quotations reflect the simple average of the net price changes of each of the contracts contained in the respective bundle. For example, a price quotation of -1 means that the average net change of the contracts within the bundle was -1 . Bundle prices are quoted in increments of one quarter of a basis point.

The value of each tick depends upon the term to maturity of the respective bundle. The dollar value of a 1 basis point change on a 2-year bundle, for example, would be \$200, and each tick would thus be valued at \$50. The \$200 reflects the eight contracts contained in the bundle multiplied by \$25, the tick value for a 1 basis point change in the price of a Eurodollar contract.

Once a buyer and seller have agreed on both the price and quantity of a bundle, they must agree on the individual prices of the Eurodollar contracts contained in the bundle. The prices can be picked at random, but CME rules require that the price of at least one of the Eurodollar contracts must lie within that contract's trading range for that day. Most prices are assigned with the use of an automated system developed by the CME.

Packs

Packs are similar to bundles in that they were designed to enable traders to trade an equally weighted consecutive series of Eurodollar contracts in a single transaction. The main difference is that packs are consecutive series of four Eurodollar contracts, whereas bundles can consist of as many as 40 contracts. There are packs in each of the years that Eurodollar contracts exist, and they are given color code designations that coincide with the individual contracts. The most active packs are the red, green, blue, and gold (in Table 15.7, the golds would follow the blues, if shown).

Packs are quoted in the same way as bundles are—in increments of one-quarter of a basis point. The prices assigned to the individual legs of a pack transaction can be any price so long as the average net change is the same as agreed upon when traded.

The TED Spread

A classic spread trade for which the Eurodollar futures have been used since day one of the contract is the Treasury versus Eurodollar (TED) spread. Before liquidity dried up in the bill contract and the bill trading was forced into the cash market, this spread was defined as the price of the bill futures contract minus the price of the Eurodollar futures contract. Let

d = discount rate implied by the bill futures price

r_E = Eurodollar rate implied by the Eurodollar futures price

Then the TED spread can be written as

$$(100 - d) - (100 - r_E) = r_E - d$$

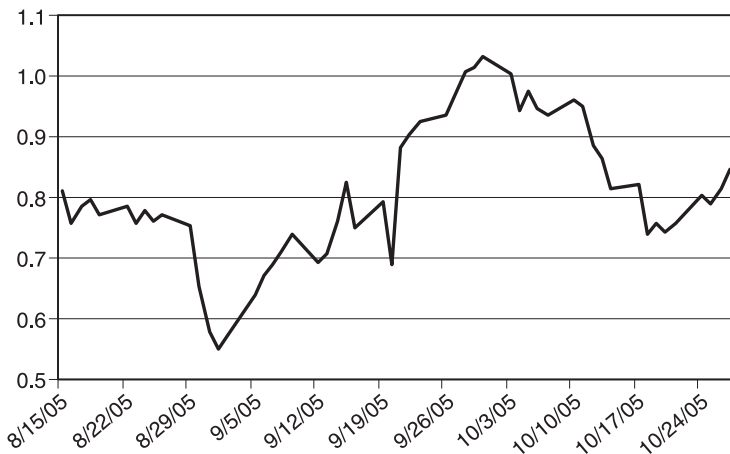
That is, it reduces to the rate on Eurodollars minus the bill rate and is thus naturally positive, since 3-month Eurodollars trade at a spread above 3-month bills.

In market jargon, a trader *buys the TED spread* when he buys bill futures and sells Eurodollar futures, and he *sells the TED spread* when he sells bill futures and buys Eurodollar futures. (A mnemonic hint: when you buy the spread, you buy the instrument that starts with a b, namely, bills.) Normally, the TED spread widens when rates rise and narrows when rates fall.

A good example of the volatility that sometimes occurs in the TED spread occurred in late 2005 (Figure 15.4). Immediately following Hurricane Katrina, investors believed that the economic repercussions of the storm would prod the Federal Reserve to end its series of interest-rate hikes. As a result, the TED spread narrowed sharply, reflecting the removal of expectations for future interest-rate hikes that had been priced into Eurodollar contracts. Ultimately, however, the spread reverted to where it was before Katrina and in fact widened more, reflecting a return to the view that the Fed would continue with its interest-rate hikes. A trader sensitive to market developments could have profited by first going long the spread and then shorting it.

FIGURE 15.4

Differential between the yield on 3-month T-bills and the implied yield on March 2006 Eurodollar contracts (in percentage points)



For many years the market for the TED spread was more liquid than the market for bill futures. Today, the bill portion of the TED spread occurs only in the cash market, owing to the lack of volume in the bill futures market. Instead of just doing a TED spread (3-month bills against 3-month Eurodollars), traders will often track the relative spread between the 2-year note and the equivalent Eurodollar strip and between the 3-year note and the equivalent Eurodollar strip. Spreaders trade these 2- and 3-year spreads in a fashion similar to the way they trade the TED spread—only one leg of the trade is done in the government securities market, the other in Eurodollar futures.

FEDERAL FUNDS FUTURES

The primary way in which investors manage their risks in the money market is by trading the Eurodollar contract, which closely tracks the federal funds rate, the benchmark rate effectively controlled by the Federal Reserve and the rate that the Fed uses to transmit its monetary policy. Also available to investors is the Chicago Board of Trade's federal funds future, which began trading at the CBOT in 1988 but which did not become active until many years later. The contract became even more active beginning in 2003 when options on fed funds futures were introduced. Still, open interest on fed funds futures pales in comparison to Eurodollars; in December 2005 the total open interest for fed funds futures was just 380,000 compared to 9.5 million for Eurodollar contracts.

Despite the relatively low tally of open interest in fed funds futures versus Eurodollar futures, Gürkaynak, Sack, and Swanson found that for horizons of up to six months, investors' forecasts measured using the fed funds futures rates outperform all other market-based measures in predicting actual future funds rates.⁵ The study validates the use of fed funds futures to gauge expectations on Fed policy.

The CBOT fed funds future is designed to reflect market expectations for the *effective* fed funds rate, which is the interest rate at which depository institutions lend money to one another overnight. More specifically, the price for fed funds futures reflects the weighted-average of the daily effective fed funds rate, rounded to the nearest one-tenth of 1 basis point,

⁵ Refet S. Gürkaynak, Brian Sack, and Eric Swanson, "Market-Based Measures of Monetary Policy Expectations," Finance and Economics Discussion Series, Federal Reserve Board of Governors, September 2002.

for each respective delivery month, which consists of 24 consecutive calendar months, although there tends to be very little trading volume beyond a few months out. Each contract has a notional value of \$5 million.

Although the pricing of the fed funds contract is directly tied to the effective fed funds rate, the effective rate is closely correlated to the Federal Reserve's target rate, thanks to the Fed's daily open market operations, which attempt to create conditions in the banking system that will result in a close alignment between the effective rate and the target rate. The Federal Reserve's success in aligning the two can be measured in the spread between the two rates, which was just 2 basis points in the year ended January 2006.

Fed funds futures trade via open outcry from 8:20 a.m. to 3 p.m. New York time, and from 8 p.m. to 4 p.m. electronically. Trading in expiring contracts closes at 3 p.m. on the last trading day for each contract.

Using Fed Funds Futures to Track Market Expectations on the Fed

Fed funds futures are frequently sought by investors and cited by Fed officials for the information that they contain with respect to rate actions expected from the Federal Reserve. Using federal funds futures to track market expectations on the Fed is relatively simple. Here are the steps:

1. *Choose a contract month.* This step isn't as easy as it might seem at first blush. The contract month that you choose will depend upon the date within the month that the Federal Open Market Committee (FOMC) meeting is scheduled to take place. If the meeting is scheduled for very late in the month and there's no meeting the next month, it's best to choose the contract in that following month. If you don't, you'll have a lot of math to do. If you do, you're getting a clean read on what the market believes the prevailing fed funds rate will be in the month following the meeting. This is the best method for getting a quick, close approximation. One drawback of this is that the contract of the contract month that follows FOMC meetings could contain expectations over the possibilities of an intermeeting rate move. This is why the most accurate way to gauge market expectations for a specific meeting is to choose the contract of the contract month in which the FOMC meeting takes place.

2. *Calculate the implied federal funds rate on the futures contract.* The implied federal funds rate is found by simply subtracting the price of the federal funds futures contract from 100. For example, if the FOMC meeting is being held in early November and you choose the November contract to determine the market's expectations for the outcome of that meeting, and the price of that contract is 97.07, the implied rate is therefore 2.93%.
3. *Calculate the weighted average expected of the actual federal funds rate.* The next step is to calculate the weighted average of the effective federal funds rate (the daily weighted average) using both the current federal funds target determined by the Fed when it last changed it, and a level that you believe might be implemented at its next FOMC meeting. For example, if the FOMC is scheduled to meet on the tenth of a given month that contains 30 days, the weighted average would be:

Weighted average of fed funds rate

$$= \left(\frac{(n) \text{ effective fed funds rate} + (n2) \text{ effective fed funds rate}}{30} \right)$$

where

(n) = number of days during the contract month that the effective federal funds rate is expected to prevail at a given target rate

(n2) = number of days during the contract month that the effective federal funds rate is expected to prevail at a target rate set at the meeting scheduled for that contract month

4. Assuming that the federal funds rate was at 3.0% during the first 10 days of the month, and at 2.75% the final 20 days of the month (it's lower because we are assuming that the Fed lowered interest rates at its meeting on the tenth of the month), the weighted average is 2.83%. This means that if the Fed were to cut rates from 3.0% to 2.75% at its FOMC meeting on the tenth of the month that the federal funds rate would average 2.83%. This is the rate that traders in the federal funds futures contract are betting on or against and the rate that is used to pinpoint the probability assigned to the likelihood of that rate cut.
5. Subtract the weighted average of the federal funds rate from the current federal funds target (set by the FOMC when it last changed it; assume in this case it was 3.0%): 3.0% – 2.83% = 17 basis points.

6. Now that you know the number of basis points that it will take for the federal funds contract to fully price in a rate move by the FOMC meeting (17 basis points, in this example), divide the number of basis points in rate cuts priced into the federal funds contract (7 basis points, in this example) into the number of basis points that it would take to fully price in the rate cut: $7 \div 17 = 41\%$. Thus, the contract suggests that the market has assigned a 41% probability to the odds of a rate cut at the FOMC meeting.

Now, here's an important qualifier: First, keep in mind that, as you enter the contract month used for your calculation, you must use the actual effective federal funds rate rather than the target federal funds rate. It can differ each day. The target rate is simply that—a target. Where it actually trades is unknowable until it actually trades. Therefore, in your calculation you must substitute the actual rate for the target rate as the month progresses. These data can be obtained from the Fed's Web site at federalreserve.gov under the data section on the navigation bar.

The federal funds futures contract is great for assessing the market's expectations for about a six-month time horizon, but as mentioned earlier, it is a poor gauge beyond that. The open interest tends to dwindle beyond a six-month time horizon and is usually next to nil beyond that. What to do? Turn to Eurodollar contracts.

Using Eurodollars to Track Expectations of Future Short-Term Rates

As shown earlier, Eurodollar futures are one of the most liquid futures contracts in the world and are easily the most liquid contract based on short-term interest rates. It is used by a wide variety of entities to hedge short-term interest-rate exposures. The contract represents rates paid on 3-month Eurodollar time deposits, or dollars deposited outside the United States. Eurodollar rates tend to be tightly correlated to the federal funds rate, and this makes the Eurodollar contract a great gauge on market expectations of the future short-term interest rates.

The method used to determine the market's expectations on the federal funds rate using Eurodollar contracts is similar to the steps shown earlier with the federal funds futures contract. There are a couple of twists, however. First, Eurodollar futures contracts trade in series of three-month increments (except in the upcoming three months; but the federal funds futures are more reliable in this case). This means that when you are

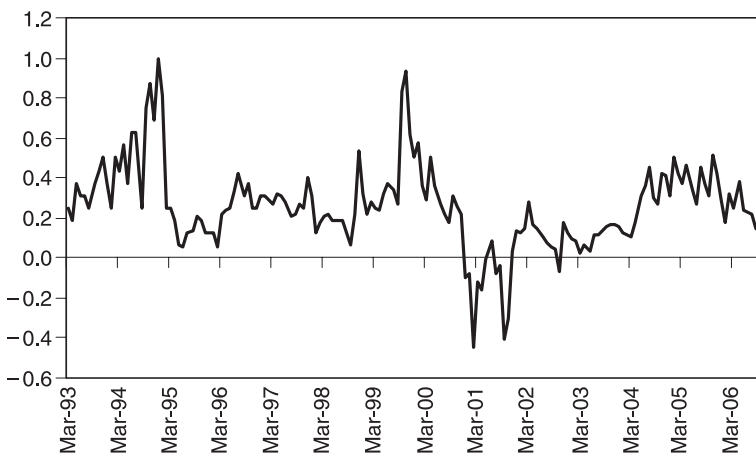
calculating the federal funds rate out in the future, you won't be making a pinpoint assessment. This is not a big problem, however, since you are most concerned with making an accurate general assessment during those months anyway.

Second, and more importantly, the spread between the Eurodollar time deposit rate and the federal funds rate tends to fluctuate depending upon where the Federal Reserve is expected to be in its interest-rate cycle. This means that the implied rate on Eurodollar futures contracts is not likely to reflect the market's expectation on the federal funds rate; rather, it is likely to reflect the market's expectations on both the federal funds rate and the spread between LIBOR and the federal funds rate. This spread tends to widen when the Fed is raising interest rates, and it tends to be very narrow when the Fed is lowering interest rates. Thus, the spread in effect represents a risk premium for the odds that the federal funds rate might rise. Figure 15.5 illustrates the behavior of 3-month LIBOR compared to the federal funds rate. Notice how the spread widened when the Fed raised interest rates in 1994 and 1999, narrowed when the Fed cut rates in 2001, and widened when the Fed raised interest rates in 2004 and 2005.

The behavior of the spread is therefore the most important variable that you must contend with when using Eurodollar futures to assess the market's expectations of future short-term interest rates. Simply assume

FIGURE 15.5

3-month LIBOR minus the target fed funds rate



that the spread will widen when the market is building in expectations of interest-rate increases and narrow when the market expects rates to be cut. For example, assume that the federal funds rate is currently 3% and that the implied rate on the Eurodollar futures contract 12 months hence is at 4%. This appears to indicate that the market expects the Fed to raise the federal funds rate next year. To what level? To find the answer, simply subtract what you think the spread between LIBOR and the federal funds rate will be next year (50 basis points is a reasonable assumption when it's early in a Fed campaign to raise interest rates), and that number will represent the market's expectations on the fed funds rate (3.5% in this example).

REVIEW IN BRIEF

- Most *futures* contracts, like many *forward* contracts, specify that the seller of the contract will deliver to the buyer a specific amount of a specific item at a specific price on a specified future date, although in the Eurodollar futures market contracts are for cash settlement.
- Investors find many advantages in using futures contracts as opposed to other instruments. These include liquidity, transparency, reduced counterparty risk, and portfolio diversification.
- Forward transactions are common in the money market, because there are many entities that seek to hedge against many different types of interest-rate risk.
- Electronic futures trading has grown sharply in recent years, and today the vast majority of Eurodollar futures transactions are conducted electronically.
- Eurodollar contracts have become the most active futures contract in the world, when measured in terms of open interest.
- Eurodollar contracts are used by a variety of entities to hedge against interest-rate risks. For example, commercial banks use Eurodollars to hedge against rollover risks that stem from lending activities.
- Helping to facilitate large transactions in the Eurodollar market are *bundles and packs*, which package a series of Eurodollar contracts into one.

- The *TED spread* tracks the yield difference between Treasury and Eurodollar rates. The spread will fluctuate on changes in views surrounding the economy, the Fed, and the financial markets.
- *Fed funds futures* provide the best gauge of expectations for the federal funds rate over the short run, but Eurodollar contracts provide better information beyond a six-month time horizon.

Treasury Futures

In 1977, the *Chicago Board of Trade* (CBOT or Board to Street folk) introduced a futures contract on Treasury bonds, which became successful and was the most heavily traded financial futures contract until the Eurodollar contract eventually displaced it. The success of the CBOT Treasury bond contract led to the introduction of contracts for Treasury notes, including the 2-, 5-, and 10-year T-notes. In 2001, changes in the Treasury department's auction calendar raised the prominence of the 10-year T-note to benchmark status, making the 10-year note the most active Treasury contract. In late 2006, over 2 million 10-year futures contracts were traded in an active day, and open interest ranged from about 2.0 million contracts to 2.4 million contracts.

The 2-year Treasury note has a face value of \$200,000; Treasury futures have a face value of \$100,000. This means that the notional value of the daily volume in 10-year note futures is close to \$200 billion per day. This is about five times the notional value of the Treasury bond futures that were traded in 1990. While the trading volume in futures is substantial, it is eclipsed by the daily trading volume in the cash market, which averaged close to \$550 billion in the first three quarters of 2006.

In Chapter 15, we describe the functions of a futures exchange, how margin is handled, and how a futures contract can be used to speculate, to hedge, and to arbitrage. These remarks all apply, with certain obvious modifications, to the Treasury bond and note contracts.

Treasury bond and note futures, like cash Treasury bonds and notes, are traded on the basis of price. Consequently, longs profit when the

prices of bond and note futures rise; shorts, when they fall. Prices of T-bond futures are quoted *in 32nds*; those of 10- and 5-year notes are quoted in *64ths*; 2-year notes are quoted in *128ths*, or one-quarter of one thirty-second.

For the Treasury bond contract, a price of 94-17 should be read as $94\frac{17}{32}$; the minimum price movement or *tick*, as it's called, is $\frac{1}{32}$. The minimum price movement for 10-, 5-, and 2-year notes more closely resembles the price movement seen in the cash market, where most of the actively traded Treasuries trade in increments of 64ths; shorter dated issues such as 2-year notes trade in 128ths. In the cash market, the addition of $\frac{1}{64}$ to the market price is indicated by adding a plus sign. Thus, a quote for cash Treasuries of 101-18+ equals 101 plus $\frac{18}{32}$ plus $\frac{1}{64}$, which adds up to $101\frac{37}{64}$.

THE CONTRACT

Once a quarter (subject to the congressionally imposed debt ceiling), the Treasury department markets a new 10-year note in its refunding, which is a set of auctions whose proceeds are used for the retirement of maturing Treasury debt and for the Treasury's daily funding needs. The Treasury markets its securities through a yield auction, which establishes the coupon on the new issue. By its nature, this procedure has, because of the volatility of interest rates, created a situation in which outstanding Treasury securities are a heterogeneous mix: they have varying current maturities; they have different coupons; and there are older issues which are callable, but recent issues aren't.

When the CBOT first created the Treasury bond contract, it realized that if it were to create a successful, liquid contract for Treasury bond futures, it could not, given the heterogeneity of outstanding Treasury bonds, design its futures contract around a single issue that would be deliverable against the contract. Instead, it had to design its contract so that a wide and changing array of bonds would be deliverable on equitable terms against it. To see how the CBOT did this, we examine the delivery provisions of the contract.

DELIVERY PROVISIONS

Someone who had sold bond futures and is thus *short* the contract may liquidate her position by *offset*: by buying bond futures. (In practice, *most*

bond futures positions, both short and long, are liquidated by offset.) However, a short may, alternatively, elect to liquidate her position by delivering, during a specified delivery period, contract-grade Treasuries.¹ Although delivery is used to settle only 1% of all financial futures traded at the Chicago Board of Trade, the delivery provisions of the Treasury futures contracts are crucial because they play an important role in determining the relationship between the price at which Treasuries trade in the cash market and the price at which Treasury futures trade.

The Delivery Period

A Treasury futures contract is identified by the month in which it expires, for example, the March 2006 contract, the June 2006 contract, and so on. A short may deliver Treasuries to cover her short on *any* business day during the delivery month corresponding to the contract she's short, but on the last business day of that month, she must deliver if she hasn't done so previously.

A short who decides to deliver Treasuries must notify the CBOT of her intent to do so by 8 p.m., Chicago time. This is done through the short's clearing services provider (CSP). The next day, the CBOT designates a long to whom delivery will be made, informs the designated long that she will be receiving Treasuries, and instructs the seller to deliver Treasuries to that long. The long, for her part, has *no* option as to whether or when to receive bonds; she is chosen because, at the time of notification to deliver, her long in the expiring bond contract is, among such positions still outstanding, the one that was put on at the earliest date. Once the short's CSP has matched the short clearing firm with the long clearing firm(s), the short cannot reverse her declaration to deliver. The day after the CBOT designates a long to receive, the short delivers bonds to that long versus payment in fed funds.

A Treasury futures contract may be traded during the delivery month except during the last seven business days of that month, but volume tends to diminish because the longs don't want to risk being designated for delivery.

¹ In this chapter, the term *short* refers to an entity that has *sold* Treasury futures and is thus short Treasury futures; conversely, the term *long* refers to an entity that has *bought Treasury futures* and is thus long Treasury futures.

Deliverable Grades

A Treasury security is called *contract grade* if it's eligible for delivery in settlement of a short position in futures. For 10-year Treasury notes, the CBOT contract provides that a contract-grade Treasury security must have, from the first day of the delivery month, at least *6½ years remaining to maturity but not more than 10 years*. For the 5-year T-note contract, Treasury notes with an original maturity of not more than *5 years and 3 months and remaining term to maturity of not less than 4 years and 2 months* are eligible for delivery. For T-bond futures, Treasury bonds that, *if callable*, are not callable for at least 15 years from the first day of delivery month or, *if not callable*, have remaining term to maturity of at least 15 years from the first day of the delivery month. For the 2-year note, eligible Treasury securities include those with original term to maturity of not more than *5 years and 3 months*, and remaining term to maturity of not less than *1 year and 9 months* from the first day of the delivery month.

THE INVOICE PRICE

As mentioned earlier, the CBOT contract is for Treasuries having a face value of \$100,000, with the exception of the 2-year T-note contract, which has a face value of \$200,000. Thus, a trader who is short 10 contracts must, to liquidate her short, deliver Treasuries with a par value of \$1 million, or \$2 million in the case of the 2-year Treasury. How many dollars the trader will get for her Treasuries depends on the price at which these bonds are invoiced in the futures-market delivery process. This invoicing procedure takes a little explaining.

Calculating the Principal Amount

Under the CBOT contract for 10-year Treasury notes, a *contract-grade Treasury security carrying a 6% coupon* would (if there were one) be invoiced at the futures price that prevailed on the exchange at the 3 p.m. close on the day the short gave notice to deliver, plus accrued interest. Thus, if futures closed at $96\frac{1}{32}$ on the day the short gave notice, she would receive for her 6% notes a dollar price of 96.50 or \$96,500 per \$100,000 of notes delivered; the short would also receive interest accrued through the settlement date on her bonds. However, a short may find herself delivering notes with a 6% coupon for quite some time, because there are no

such deliverable-grade bonds maturing until 2026 and the 10-year note hasn't traded with a yield of 6% or higher since July 2000.

The Delivery or Conversion Factor

To enable shorts to deliver a contract-grade Treasury security with any coupon—high or low—on equitable terms, the CBOT uses what's called a *conversion* or *delivery factor* in the invoicing of contract-grade Treasuries. *For the 10-year Treasury, the factor associated with any deliverable Treasury security is calculated by dividing by 100 the dollar price that security would command if it were priced to yield 6% to maturity (or to call).*

In Chapter 5's discussion of duration, we introduce the concept of present value. The price at which any bond trades in the cash market equals the present value of the cash flows it will throw off over time discounted at its yield to maturity. There is nothing mysterious about this. It follows from the definition of a bond's yield to maturity as the rate at which future payments from the bond must be discounted in order that they sum to the bond's current market price.²

For Treasury notes eligible for delivery against the 10-year contract, when we discount the notes at 6%, the cash flows the notes will throw off over time will give us *the note's present value in the 6% world of futures*—the price at which the bond would trade if its yield to maturity were 6%. If we next divide this present value by 100, we obtain the bond's *factor*.³

² A problem with this classic definition of a bond's yield to maturity is that it assumes that all cash flows thrown off by a bond prior to maturity will be reinvested at a rate equal to the bond's yield to maturity. Since different bonds trade at different yields to maturity, this assumption cannot hold for all bonds even at one point in time; and in a world of changing yield levels, it will not hold even for one bond over many time periods. The definition of a bond's yield to maturity is arbitrary and necessarily so; in a world where the future is uncertain, future reinvestment rates cannot be known with certainty.

An attraction of zero-coupon securities is that, because they pay no coupon, they expose the investor to no reinvestment risk. However, even on a zero, the *real rate of return* (the *nominal rate minus the rate of inflation*) is uncertain because future rates of inflation cannot be known with certainty.

³ The need to divide a note's present value, discounted at 6%, to obtain its factor results from the bond market convention of quoting price as dollars per \$100 of face value. This convention, along with the convention of expressing yields as percentages rather than as decimals, causes conventional bond market formulas to be strewn with needless and confusing divisions and multiplications by 100.

If a bond carries a coupon greater than 6%, its present value—discounted at 6%—will exceed 100; and its factor will therefore exceed 1. If we discounted at 6% an 8% bond with a current maturity of 6½ years or more, we'd find that its present value exceeded 100 and that its factor therefore exceeded 1.

If, alternatively, we discounted at 6% a bond carrying a coupon of less than 6%, we'd find that its present value was less than 100 and that its factor was therefore less than 1.

Let's put our definition of the factor in symbols.⁴ Let

$\mathcal{F}$ = The factor

Then, for any bond

$$\begin{aligned}\mathcal{F} &= \left(\frac{\text{Dollar price at 6\% yield to maturity}}{100} \right) \\ &= \left(\frac{\text{Present value discounted at 6\%}}{100} \right)\end{aligned}$$

To sum up, the factor associated with a bond having a *coupon greater than 6%* always *exceeds 1*. Conversely, the factor associated with a bond having a *coupon less than 6%* is always *less than 1*. The factor associated with a bond having a *coupon equal to 6%* is always *equal to 1*. Here are two examples. Vis-à-vis the March 2006 T-bond futures contract, the 8.125% of 2021 had a factor of 1.208; the 6% of 2026 had a factor of 0.9999. For further examples, see Table 16.1.

The further a bond's coupon diverges from 6%, the farther its factor will diverge from 1. For example, a seller would receive more for delivering a bond with a 9% coupon than she would for delivering a bond with a 7% coupon; this makes sense because, in the 6%-yield environment of futures (or in any positive-yield environment for that matter), the present value of a 9% bond will exceed that of a 7% bond.

The value of any coupon, high or low, depends on how long an investor will receive that coupon. Thus, a bond's time to maturity (or call)

⁴ Actually in this definition, a bond's time to maturity (or to call) is its current maturity rounded down to the years plus the number of whole 3-month increments remaining in its life as of the first day of the delivery month.

TABLE 16.1

Selected bases as of January 6, 2006
 Contract: March 2006 USH Futures Price: 114-04

Issue	Price	Factor	Gross Basis	Implied Repo (%)	Net Basis
8½ 05/15/21	136-14+	1.2083	10.6	4.80	-4.0
8½ 08/15/21	136-26	1.2102	15.2	4.28	1.1
8 11/15/21	135-25+	1.2000	19.5	3.83	5.6
7½ 11/15/22	132-26+	1.1687	37.3	1.79	25.1
7¼ 08/15/22	128-08+	1.1285	36.3	1.64	25.6
7½ 02/15/23	127-11	1.1177	45.7	0.54	35.6
6¼ 08/15/23	117-16	1.0265	59.5	-1.77	52.5
7½ 11/15/24	133-23+	1.1663	75.0	-2.19	64.0
7½ 02/15/25	135-17	1.1813	78.4	-2.46	67.4
6½ 08/15/25	126-20+	1.0990	90.6	-4.55	82.1
6¼ 08/15/26	125-26+	1.0871	107.5	-6.53	99.6
6 02/15/26	115-28	0.9999	103.4	-7.23	97.6
6½ 11/15/26	122-24	1.0585	112.1	-7.36	104.7
6½ 02/15/27	124-19	1.0735	117.0	-7.74	109.6
6½ 08/15/27	121-20	1.0446	126.2	-9.18	119.6
6½ 11/15/27	118-14	1.0150	130.9	-10.13	124.8

enters into the calculation of the dollar price that the bond would command at a given yield to maturity (or call). Specifically, as a bond's current maturity declines, its factor changes: from one successive contract to the next, the factor approaches, ever so slowly.⁵

Invoicing Principal

Bonds delivered via the CBOT are invoiced at a price that equals *the price at which bond futures close* on the day when the short gives notice of intent to deliver times the bond's *factor*; this product represents the value the CBOT assigns to the bond's *principal*; the seller also receives interest accrued on the bonds through the settlement date.

⁵ There's a term for this, *factor slippage*.

Let's put that in symbols. Let⁶

$$P_F = \left(\begin{array}{l} \text{The price (per \$1 of face value) of bond futures,} \\ \text{i.e., the price quoted in the marked divided by 100} \end{array} \right)$$

Then

$$\left(\begin{array}{l} \text{The invoice price of} \\ \text{a bond's principal} \\ \text{per \$1 of face value} \end{array} \right) = P_F \mathcal{F}$$

Adding Accrued Interest to the Invoice Price

The short delivering bonds under the CBOT contract receives not only dollars for principal, but dollars for *accrued interest* on her bonds. Let

c = a bond's coupon rate (stated as a decimal)

B = the number of days in the bond's current coupon period (it may range from 181 to 186)

t = the days during the current coupon period on which interest has accrued as of the settlement date

a_i = accrued interest on the bond, per \$1 of face value

Then, in invoicing a bond, accrued interest is calculated as follows:⁷

$$a_i = (c/2) (t/B)$$

Using the above expressions, let's work through an example. Suppose that, on 1/5/06, a short notified the CBOT that she intended to deliver the 4s of November 2012, which had a factor of 0.8937 against the March 2006 contract. On this date, futures closed at 109-22. Thus,

⁶ We adopt, in the remaining equations presented in this chapter, the practice of (1) quoting all bond prices—cash, futures, and forward—in terms of dollars *per \$1 of face value* and (2) quoting yield as a decimal. Doing so permits us to state key relationships in their simplest form. Note that it makes *no* difference whether we take a bond's price to be dollars per \$100 of face value or dollars per \$1 of face value so long as we are consistent when, for example, we figure the invoice price of \$100,000 of a specific issue.

⁷ The 2 comes into the formula because the T-bonds pay interest twice a year. Thus, accrued interest due is figured as one half the coupon rate times the fraction of the current coupon period that has elapsed as of settlement.

the short would have received for her bonds, per \$1 of principal value delivered,

$$\begin{aligned} P_{F,T} &= \frac{109^{22/32} \times 0.8937}{100} \\ &= 0.98028 \end{aligned}$$

As of January 6, 2006, 55 days had elapsed in the current, 182-day coupon period of the 4s of 2012; thus, on this date, accrued interest on this issue per \$1 of face value was:

$$a_i = 0.00608$$

From the above numbers, it follows that a short who delivered, on January 13, 2006, \$100,000 of the 4s of 2012, would have received for her bonds

$$\$100,000 \times 0.98028 = \$98,028.00$$

for principal; and

$$\$100,000 \times 0.00608 = \$608.00$$

for *accrued interest*. Summing these amounts, we get

$$\begin{aligned} \text{Invoice price} &= \$98,028.00 + \$608.00 \\ &= \$98,636.00 \end{aligned}$$

Interest accruals are thus computed in the same way as are Treasury securities. The details of coupon accrual for Treasury bonds and notes are provided in Appendix B of *31 CFR Part 356*, available as *Department of the Treasury Circular, Public Debt Series No 1-93*.

BASIS

For a trader or investor to use Treasury futures to hedge or to arbitrage, she must understand how the price of futures relates to the cash-market prices of outstanding, contract-grade Treasuries. To describe this relationship, we begin with the concept of basis.

A deliverable bond's *basis* is the difference between the price at which a bond trades in the cash market and the (invoice) price at which it

is valued (could be sold) for forward delivery in the futures market. In other words, basis is *the difference between a bond's cash-market price and its (forward) present value in the 6% world of futures*. Let

P = a bond's price in the cash market

β = a bond's basis

Then in symbols,

$$\beta = P - P_F \mathcal{F}$$

For example, on January 6, 2006, the 4s of 2012 were trading in the cash market at a price of 98-01 for settlement on January 9, 2006. Its cash for the March 2006 10-year contract was 0.8937, and the futures price was 109-20+; so the basis, β , of the issue was:

$$\begin{aligned}\beta &= 98\frac{1}{32} - (109\frac{20.5}{32} \times 0.8937) \\ &= 1.5/32\end{aligned}$$

A bond or basis trader would simply say that, on January 6, 2006, the basis of the 4s of 2012 was 1.5. *In the Treasury market, it is understood that basis is always quoted in 32nds.*

At any one time, many Treasury issues will be contract grade. If one were to calculate, during a period when carry was *positive*, the basis for each of these issues, one would find that all issues had a *positive* basis; some large, some small. (Table 16.1 provides examples.)

A bond's basis is composed of two principal elements, the first of which is *carry*. Recall that carry is the profit or loss a trader earns by holding a fixed-income instrument, the purchase of which she has financed with borrowed money; if a bond has a current yield of, say, 5% and can be financed with 4% repo, a trader who buys and finances this bond will earn, exclusive of any capital gain or loss, approximately one point of carry. The carry rate is an *annual* rate. To calculate actual carry earned, one must know the *holding period*: 1 year, 90 days, 30 days, or whatever.

Also, carry can be calculated *ex ante* only if a trader locks in a term repo rate for her full holding period. Alternatively, a trader might reason: "The yield curve is upward sloping; interest rates are unlikely to rise; so I'll take my chances and finance day to day." In that case, a trader can't know with certainty what carry she'll earn over her holding period.

Dealers rarely engage in transactions with *negative carry* and typically do so only when they believe that there is a possibility of an interest-rate cut on the near-term horizon. Such traders are sometimes given their marching orders or at the very least feel pressure to avoid the daily losses associated with holding securities that yield less than the cost of money.

A Bond's Carry-Determined Forward Price

If one party agrees to sell a specific bond at a specific price to another party at a specified future date, that trade is referred to as a *forward contract*, and the contract price is referred to as a *forward price*.

For any bond issue, carry (which depends both on a bond's current yield and on the relevant term repo rate) determines, for each forward date, a unique forward price. This (carry-adjusted) price is called the bond's *forward price*.

To illustrate, assume that a bond that yields 5% can be financed with term repo for three months at 4%. The bond's forward price equals its current cash-market price *minus* the profit a trader could earn by buying the bond, financing it for three months, and selling it for delivery three months hence.

Whenever carry is positive, a bond's forward price will be *less than* its current market price; whereas if carry is *negative*, the *converse is true*.

Given a complete term repo market, the possibility of risk-free arbitrage will ensure that a bond trades for forward settlement at its carry-determined forward price. For example, if a bond's quoted forward price exceeded its carry-determined forward price, this would elicit the following arbitrage: traders would buy the bond in the cash market, finance it, and simultaneously sell it for forward delivery. Because this arbitrage is risk-free, it would continue until the forward price at which the bond was offered had fallen to its carry-determined forward price. Thus, arbitrage guarantees that a bond's quoted forward price will not exceed its carry-determined forward price.

Consider now the flip situation: the forward price at which a bond is quoted is *less than* its carry-determined forward price. Such a low forward price would encourage holders of the issue to do the following risk-free arbitrage: sell the issue in the cash market, invest the proceeds in repo, and repurchase the issue for forward delivery. This arbitrage would drive a too-low forward price up to its carry-determined level.

Carry as an Element of Basis

Since a futures contract is just an exchange-traded forward contract, a fundamental component of a bond's basis to futures must be carry. To see this, note that, if the bond contract were for a specific issue, the delivery value of this issue would, neglecting transaction costs, always precisely equal the issue's forward price for delivery on the last day of the futures contract.

From this, it follows that, when a futures contract still has some time to run, carry must be one element in a bond's basis. In thinking about carry, it's best to begin with the case in which the yield curve is positively sloped and carry is therefore also positive. That's the normal situation and the one that's easiest to grasp. However, carry may in practice also be negative or zero. The sign and size of carry will depend on the slope and steepness of the yield curve. When the yield curve inverts and carry is *negative*, the basis of some or all contract-grade bonds may be *negative*. On the other hand, when the yield curve slopes upward and carry is *positive*, then the bases of all contract-grade bonds must, as shown in the following sections, also be *positive*. Put another way, when carry is positive, futures prices are lower than cash prices by at least the value of carry.

VALUE (OR CARRY-ADJUSTED) BASIS

If we calculate a bond's basis and subtract from it the bond's carry (positive or negative) to the last delivery day of the futures contract, we are typically left with a positive sum. This sum varies from one deliverable bond to another, and sometimes it can be fairly large (Table 16.1). A logical term for this second component of basis is *carry-adjusted basis*. However, that's a bit of a mouthful, so we use a shorter term, *value basis*.

A bond's value basis, regardless of the market conditions under which it's measured, is never negative. Thus, value basis appears to reflect factors that give cash bonds value relative to bond futures. Also, as noted below, no risk-free arbitrage exists to eliminate *positive* value basis.

One reason that Treasury futures tend to trade somewhat cheaply to cash Treasuries probably lies in the fact that futures are heavily used to hedge not only Treasuries but also interest-rate swaps and other instruments as well. Presumably, some portion of the value basis of deliverable Treasuries reflects the dominance in the market for Treasury futures of dealers and investors who seek to reduce market risk from various sources by shorting futures.

CONVERGENCE OF CASH AND FUTURES PRICES

We next turn to what it means to say that the prices of cash bonds and of bond futures converge at delivery. First, we recall that a bond's basis has two elements: carry and value basis. The strict meaning of *convergence* relates to the convergence of the carry basis, that is, to the fact that carry goes to zero as the time to futures expiration goes to zero.

The value basis will converge to zero only in the sense that the *delivery option* tends to zero. However, this will occur only for those issues that are "cheap enough" to deliver, that is, for those issues for which the delivery option *will probably not* be exercised. However, given that various other delivery options exist, even for the cheapest to deliver issue or issues, the value basis of such an issue will be positive until the last couple of days of the month.

Tenable Values of a Bond's Value Basis

A bond's value basis will have either a negative, zero, or positive value.

Negative Value Basis

While a bond's "overall" basis may be negative so long as carry is negative and significant, a bond's *value basis* must be *positive*. A negative value basis, which implies that cash is cheap to futures, would invite the following risk-free arbitrage: a trader could buy a bond having a negative value basis at its cheap cash-market price, simultaneously short futures, and eventually deliver that bond at its more expensive, futures-market invoice price. Such arbitrage would tend to lower the futures price, raise the cash-market price of the bond having a negative value basis, and thereby drive the value basis of that bond toward zero.

Zero and Positive Value Basis

A value basis of zero on a deliverable bond is sustainable over time because it creates *no* opportunity for risk-free arbitrage. The same is true for positive value basis; no arbitrageur would sell a bond having a high value basis and simultaneously buy futures in the hope that, at the expiration of futures, the high-value-basis bond she had sold or some similar bond would be delivered to her. The latter will never occur.

No alert trader of Treasury futures would deliver, to cover a short in futures, Treasury securities having a high value basis. That would be to

throw away basis. If a Treasury security is trading at a high value basis, its cash-market price exceeds the invoice price at which it could be delivered to cover a futures short. Thus, if an owner of a high-value-basis security wanted to cover a futures short by delivering, she would be better off selling her high-value-basis security in the cash market, buying a zero-basis security in this same market, and then delivering that security to cover her short. That way, she'd end up receiving the full cash-market price for her high-value-basis bond rather than its lower invoice price.⁸ Because traders do not deliver high-value-basis bonds at the expiration of a futures contract, there's *no* arbitrage that works to eliminate *positive* value basis on individual, contract-grade bonds.

Having said that, we hasten to add that, at or near the delivery period of a futures contract, not all deliverable bonds can trade at a positive value basis. If they did, then a trader could profit by selling the futures contract and taking delivery of whatever issue a short chose to deliver to her. Arbitrage of this sort will work to drive at least one contract-grade bond to a zero or near-zero (there are always transaction costs) value basis.

During the delivery period of a futures contract, as carry decays to zero, at least some contract-grade bonds will trade at or near-zero basis, none will trade at a negative basis, and some will trade at a positive basis. When these conditions hold simultaneously, cash and futures prices are said to have *converged*. (Convergence does not imply that, during the delivery period, futures will trade at a price equal to the cash-market price of every, or even of one, deliverable bond.)

As cash and futures prices converge, a movement in the price of a high-value-basis bond will have no impact on the price at which futures trade, since high-value-basis bonds are irrelevant to the delivery process. However, if a bullish development (the dollar strengthens or the inflation rate falls) were to raise the prices of all deliverable bonds and thus their bases, arbitrage would force up the futures price if the latter had not moved up *pari passu* with cash-market prices.

The Value of Delivery Options

A second and far more important reason that a bond's value basis is never negative is the various options imbedded in the bond futures contract;

⁸ If an investor owned and wanted to keep high-value-basis bonds (maybe, she'd been hedging them), she could cover her futures short by *offset*: by buying futures.

these options have value only to a short that might make delivery. Thus, a seller of futures purchases delivery options from the buyer, and the premium she pays for them lowers the price of bond futures relative to the prices of cash bonds.

An analyst who's willing to pull out her scalpel and really dig and delve can uncover as many as seven options imbedded in the bond futures contract. Some are more valuable than others; also it will prove profitable to exercise each option only under a particular constellation of market conditions—a constellation whose probability of occurrence at the expiration of a given contract may be highly probable, highly improbable, or somewhere in between.

The Day to Which Carry Is Calculated

Before we turn to the most important options, there's one more technical question to consider. A seller of futures may delay making delivery from the outset to the end of the delivery period. If carry on the bonds she plans to deliver is positive, the longer she waits to deliver, the lower will be the effective cost of the bonds she delivers. That's not to say that the short will surely make more or lose less to the extent that she delays delivery; so long as the short delays delivery, the economic outcome of her position remains uncertain because the futures price continues to fluctuate.⁹

The existence of a choice concerning when to deliver raises a question: what delivery day should be used in calculating carry and a bond's carry-determined forward price? On a cash-and carry trade, the standard is to calculate carry to the rational last delivery day of futures. So if carry is positive, it's the last business day of the month; if carry is negative, it's the first day. However, even when carry is negative, it's a rare short who delivers on the first business day of the month because, in doing so, she would give up roughly 29 days worth of other delivery options. What's rational isn't so easy to define before hand. In any case, a lot of people say, "Let's just use the first and last days of the month whether they are business days or not, since a day or two of carry won't significantly affect our analysis." Thus, it's the first and last days of the delivery month that go into the Street's computers.

⁹ Exception: the CBOT's Treasury futures contracts do not trade during the final seven business days of their delivery period.

The Option to Choose Which Bond to Deliver

If the value basis of a particular issue is high during the delivery period, much of that basis may be viewed as the value assigned by the cash market to a short's option to deliver not that issue, but some other contract-grade issue. The value of the option to *not* deliver a particular issue will vary from one contract-grade issue to another; also, it will be greater (1) the greater the relative volatility of bond prices and (2) the greater the time remaining to settlement of the futures contract.

Greater relative price volatility in the cash market for bonds enhances uncertainty about relative cash-market prices in the future and hence about which issues will be economically deliverable as the contract expires; such uncertainty, since it works to the advantage of a short, will raise the discount at which futures trade to cash and thereby enlarge the value bases of deliverable issues. Also, the longer the remaining life of a futures contract, the greater will be the uncertainty about which issues will be economically deliverable as futures expire, and the greater will be the value bases of at least some cash bonds.

The "Wild Card" Option

Yet another option available to a trader who's short futures is the right to time—down to the hour, the minute—her declaration of intent to deliver. On any day during the delivery period, a short may elect to declare her intent to deliver up to 8 p.m. and by 10 p.m. Chicago time. The clearing services provider matches the delivering short's clearing firm(s) with long positions having the longest trade date(s). The long is then informed electronically about the short's intention to make delivery. The intention is also made available to other clearing firms in the CBOT's Issues and Stops Report, which is released at around 10 p.m. on the CBOT's Web site.

During the period 3 to 8 p.m. of a delivery day, the futures price that will be used to invoice a delivery is the price at which futures closed at 3 p.m., which is when the pit session ends. The Treasury market continues to trade, however, in both the cash and electronic markets. Thus, it might occur that, after the 3 p.m. future close, prices drop significantly on bearish news. In that case, an alert trader who was short futures and chose to deliver might make some money.

To illustrate, consider a trader who is short, say, 10 bond contracts. If she's an arbitrageur betting on how the basis will move, she will (for reasons noted below) have a long position in bonds, but it will equal only a fraction, roughly $1/\mathcal{F}$, of her position in futures. If the delivery factor $\mathcal{F}$

is significantly greater than 1, say, 1.2 or 1.3, our trader must *buy in* a big tail—buy a lot more cash bonds, since the par value of the cash bonds she's long is significantly less than the par value of the futures she's short. It is partly by permitting a trader to buy in a big tail at a cheap price that the so-called *wild card option* may profit a short.

It also increases a short's profit if the move in the cash market causes the economically deliverable bond to change from one with a low factor such as 1.1 to one with a high factor such as 1.4. In the early 1980s, market conditions—rate levels, rate volatility, and so on—were such that at times exercising the wild card option could be highly profitable to a short. Since then, however, market conditions have been such that a short could not profit much from exercising this option.

An arbitrageur who is short futures and long, in ratio, a cash bond having a factor *less than 1* will own more bonds than she can deliver. Thus, should she elect to deliver, she must sell some of her bonds. For such a trader, the wild card option has no value.

The Switch Option

A third delivery option works as follows: different bonds are trading fairly close together. During the last week of the delivery month, when futures have ceased to trade, the price spread between the bond a trader owns and the next economically deliverable bond changes such that the second bond becomes relatively cheaper; in this case, it is more profitable for the trader (1) to sell the bond she owns and (2) to buy and to deliver the second bond.

Dissecting all the options embedded in the bond contract and analyzing when they will or won't have value leads to a lengthy and sometimes tedious discussion. For the reader who wants to know more, there's a book: *The Treasury Bond Basis* by Burghardt, Lane, and Papa (Chicago: Probus, 1989); see especially Chapter 3. See also *Money Market Calculations* by Stigum and Robinson (New York: McGraw-Hill, 1996).

The Importance of Timely Deliveries

In the cash market, failures to deliver are common and are thus an acceptable, although not encouraged, settlement practice. In the futures market, failure to deliver is critical to all the parties involved and is not acceptable. Any failure to make or take delivery on CBOT, in complete accord with

contract specifications, can result in significant economic and regulatory penalties, both to the failing party and to the failing party's clearing firm. Clearing firms have a particularly strong role in the process because deliveries do not take place directly between the short and the long; rather, the clearing firms act as agents for two parties. For example, the clearing firm for the short must both (1) determine whether the short has delivered deliverable-grade Treasury securities in sufficient quantity and in due time to meet contract requirements and (2) distribute to these same accounts the funds that it receives for Treasury securities it delivers.

Technical Factors Affecting the Value Basis

It was once fashionable to say that a bond's *entire* value basis represented the value of delivery options. But studies that attempted (using the Black-Scholes model) to place dollar values on the delivery options associated with various bonds relative to various futures contracts suggested that the value bases of some bonds exceeded any rational value that could be assigned to associated delivery options. Thus, the Street now thinks of a bond's value basis as the *maximal value* of the relevant delivery options but recognizes that these options need not be worth that much. "The value basis," noted one trader, "has meaning only to the extent that it is saying how relatively expensive or cheap an issue is. You could get the same meaning by saying, 'Well, the 4s of 2015 are in certain environments very expensive to other issues.' That would mean exactly the same thing."

Unusual Investor Demand

Various technical factors may also be at work causing a bond's value basis to go in or go out. One is unusual investor demand. An example of such occurred in June 2005 when a large concentration of deliverable securities for the 10-year T-note contract was thought to be held by just a few major players. Treasury prices in the cash market subsequently rose sharply when market participants speculated that deliverable securities would become more difficult to buy in the open market. In such a situation, when Treasury prices in the cash market rise faster than those in the futures market, by definition—since futures have not changed as much—the basis expands.

Stripping and Scarcity

Also, some issues have been so widely stripped and other high-coupon issues are so well buried in mutual fund and other portfolios that don't

lend them out that they rarely trade; for such an issue, a wide basis simply reflects that futures are cheap to the issue. No one would think of delivering issues that become too expensive: first, a trader could not get enough of them to deliver; second, the market would have to rally significantly for the issue to become economically deliverable.

One can argue that such issues have a value basis only mathematically. A trader knows the cash price of the issue, its factor, the futures price, and carry. So she can calculate the issue's value basis, but to say that that basis represents the value of the issue's delivery options lacks meaning.

Tightness in the Repo Market

Tightness in the repo market means that an issue goes special. Say, only \$5 billion of an issue are in public hands, and the dealers collectively short \$3 billion of it. Now buyers expect delivery of an extra \$3 billion of the issue; and, if the investors who own the original \$5 billion refuse to lend it out, then that issue becomes suddenly scarce in the collateral market: it becomes *special*. Tightness means specialty and a *very low* reverse rate.

Here's a famous example: Starting in February 1986, the Japanese bought and held onto a large part of the 9½s of 16. They did not realize that it is standard practice to lend out bonds because, at the time, they had no experience in the repo market. This situation persisted into the second quarterly refunding that occurred in May 1986; at that time, U.S. dealers, expecting the Japanese to swap out of the 9½s into the new long bond, shorted the issue. The Japanese, however, failed to do this swap with the result that the 9½s became extraordinarily special and traded, for a time, at near-zero to negative reverse rates.

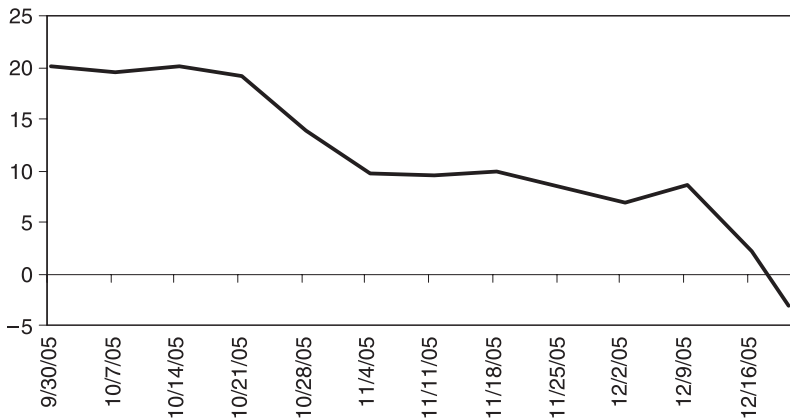
An issue's value basis can go in and out depending on how tight the issue is in the repo market. If an issue goes on *special*, its basis will tend to expand even though its carry (over the full term to futures expiration) is not *expected* to change markedly: the trade in the issue may be for a 3-month period, and the issue itself may become special for only three days; still, the issue's basis will go out for those three days.

Summary

During the delivery period of a futures contract as carry decays to zero, at least some contract-grade bonds will trade at or near-zero basis; none will

FIGURE 16.1

Basis for 7½s of 2021 versus December 2005 T-bond futures (in 32nds)



trade at a negative basis; and some will trade at a positive basis (Figure 16.1). When these conditions hold simultaneously, cash and futures prices are said to have *converged*. (Convergence does not imply that, during the delivery period, futures will trade at a price equal to the cash-market price of all, or even of just one of the deliverable bonds.)

As cash and futures prices converge, a movement in the price of a high-value-basis bond will have *no* impact on the price at which futures trade, since high-value-basis bonds are irrelevant to the delivery process. However, if a bullish development (the dollar strengthens; the inflation rate falls) were to raise the prices of all deliverable bonds and thus their bases, arbitrage would force up the futures price if the latter had not moved up *pari passu* with cash-market prices.

THE CHEAPEST TO DELIVER

Treasury futures contracts provide for *multiple deliverables*—at any point, more than 20 securities are technically deliverable into Treasury bond futures, and more than 10 securities are deliverable into the 10-year contract. However, only one or several of these securities will be *economically deliverable*. Since a trader who delivers a security having a positive value basis is simply giving away basis, she will always make the economic

choice to deliver the issue or issues that have—during the delivery period—the smallest value basis. The issue that seems, at a given time, most likely to be delivered (i.e., the issue that has the *lowest value basis*) is known as the *cheapest to deliver*. An alternative definition of the cheapest to deliver bond is that issue that has the *highest implied (break-even) repo rate*.¹⁰ These two methods of identifying the cheapest to deliver are equivalent except for possible small differences caused by rounding.

As we note above, changes in market conditions and in various technical conditions may cause the value bases on individual securities to go in and out. Thus, the fact that a security ranks as cheapest to deliver, some time prior to delivery, does not mean that it will be cheapest to deliver when delivery time actually rolls around.

Factors Determining Which Treasury Security Is Cheapest to Deliver

Which Treasury security will be cheapest to deliver depends on duration and yield. Suppose two Treasury bonds are trading at the same yield. If that yield is *below 6%*, then the bond with the *shortest duration* will be cheapest to deliver; alternatively, if that yield is *above 6%*, then the bond with the *longest duration* will be cheapest to deliver. Among bonds having the same duration, the bond with the highest yield will be the cheapest to deliver.

Factor Bias

Although they haven't occurred too often in recent years, sharp changes in the level of current yields will tend to cause a change in the cheapest to deliver. The reason is that the CBOT factor is biased. When yields are below 6%, the CBOT factors favor delivery of high-coupon, short-duration securities. On the other hand, when market yields are above 6%,

¹⁰ For any deliverable security, the *implied repo rate* is the repo rate at which a cash-and-carry trade (buy and finance cash and sell futures) would just break even. The higher a security's value basis, the lower the repo rate a trader can afford to pay to carry that security and still break even when she delivers it to cover a short in futures. Hence, just as the value basis cannot be negative, the implied repo rate cannot exceed the market repo rate without engendering a risk-free arbitrage.

CBOT factors favor delivery of low-coupon securities with long durations. Only when yields are at 6% are the CBOT factors unbiased.

An *unbiased* factor could be constructed for a deliverable Treasury security. It would be the present value of that security, discounted at current market yields divided by the present value of a 6% Treasury, also discounted at current market yields. An obvious disadvantage of such an unbiased factor is that its value would constantly change, and, consequently, a trader who put on a trade today would have to reweight that trade tomorrow using tomorrow's factor. A switch to an unbiased factor, which would be possible and was once proposed, would destroy the constancy of the factors and thereby probably also destroy basis trading, reduce the liquidity of the futures market, and reduce the efficacy of using futures to hedge.

Market participants must wrestle with many uncertainties resulting from the factor bias inherent in the CBOT's Treasury futures contracts. In particular is the impact of the changing interest-rate environment, which tends to increase when current interest-rate levels are near 6%. For example, if current rates were trading at 6.30%, they would be only 30 basis points away from levels that could cause relatively large changes in the issues that are cheapest to deliver. Between 2000 and 2005, interest-rate volatility moved sharply lower compared to previous years and it stayed below 6%. This reduced the factor bias considerably, particularly given that there were a number of securities issues with similar coupons that were eligible for delivery. For example, in early January 2006 the coupon range for the 10 cheapest to deliver was 3.625% to 4.75%, and five of the issues had a coupon of 4.25%.

The presence of a factor bias is complicated by the behavior of the cash market, where the cheapest to deliver could change because of a variety of factors. One of these is stripping. When issues are stripped, it creates a premium of several basis points, making it more difficult to know exactly which issues will be cheapest to deliver. As one basis trader noted, "The biases in the factors are well known. If they are stripping (deliverable issues) that may mess up my calculations. Suddenly, those issues will get premiums of several basis points. You cannot just say that because you have this factor bias; this bond is definitely going to be delivered. If it were that simple, we basis traders wouldn't make any money."

Moreover, when the cheapest to deliver switches from one coupon level to the next, it can move relatively quickly from low- to high-coupon issues and vice versa. Basis traders say that "if the *theoretically* cheapest

to deliver bond happens to be an issue that is not readily available and the matched-book guys find that out, supply will just dry up. People will be forced to cover their shorts in the cash market, which in turn will drive out the basis on the issue.” That’s why there are occasions when specific Treasury issues are more preferred than others, particularly the larger, more liquid issues because it’s harder to play games with them.

HEDGING WITH BOND FUTURES

Treasury futures offer an investor in cash Treasuries a means to hedge the market risk inherent in her position. Treasury futures are widely used as a hedging vehicle by participants in the various segments of the bond market, including the mortgage and securities markets, for example. In discussing hedging, we will assume that our portfolio manager’s strategy is to maintain a running hedge for her position: each time the contract that she is short nears expiration, she *rolls* that *contract*—*buys* the expiring contract to offset her short and *sells* the next contract. Alternatively, our portfolio manager might decide to hedge only when it’s her view that a rise in interest rates is likely; our remarks on hedging apply with an obvious modification or two to that tack as well.

Presumably, the objective of a fixed-income portfolio manager who hedges is to reduce—preferably to zero—her risk of capital loss. She could do that—create a situation in which her losses (gains) on her cash bonds precisely matched her gains (losses) on her position in futures only if she were hedging bonds with a constant value basis of zero, that is, bonds whose basis exactly equaled carry. Note that doing this could appeal only to a fully funded investor; a leveraged investor, having no funds to invest, could gain nothing from this strategy—neither capital gains nor carry.

The above assumptions hardly describe the real world. Consequently, our hedger will find that hedging entails both costs and risks. To investigate these, we look at the effect of relaxing the above assumptions. We begin with carry. Suppose that carry is positive and that the other assumption holds. Each time our hedger rolls her hedge, she will be “selling” her bonds at a futures price equal to their forward price. With positive carry, that means that she will lose money each time she rolls her hedge and that the amount she will lose will equal the difference between the current yield on her bonds and the rate she could have earned had she invested her capital in term repo (3-month repo, if she’s rolling her hedge from one

futures contract to the next). Moral: all else constant (forgetting our other assumption), an investor who runs a rolling hedge will tend to earn not the current yield on her bonds, but rather the term repo rate. If the yield curve is upward sloping, this lowers the rate of return she earns. Conversely, if the yield curve is inverted, this raises the rate of return she earns.

Note that it makes sense that our investor will earn on a continuously hedged fixed-income portfolio—when basis risk is assumed away—simply the term repo rate. Our investor is making a short-term risk-free investment, and on it she's earning precisely the return that a short-term risk-free investment pays.

Next, let's relax the assumption that the value basis is zero and constant; specifically, we allow for multiple deliverables. Now our hedger will find that the basis at which she puts on her hedge will contain two elements—carry and value basis. The value basis at which she puts on her hedge is not written in stone. It may go in or out during the time she's hedged. If it goes in, our hedger will lose value basis and thus money. If it goes out, our hedger will gain value basis and thus money. Whatever happens, our hedger, by shorting futures, has assumed *basis risk*.

Our hedger's risk of losing a lot of value basis will be least if she happens to be hedging the cheapest to deliver bond and if that bond stays cheapest to deliver throughout the life of the contract. In that case, she'll lose any value basis that her bonds had when she hedged them, but by definition, these bonds had, at that time, the smallest value basis of any deliverable issue.¹¹

Choosing a Hedge Ratio

Another issue our hedger confronts is choosing a ratio in which to put on her hedge. In the real world of multiple deliverables, a hedger, in choosing a hedge ratio, often looks to the bond factor. The fact that bonds delivered to cover a short in futures will be invoiced at a price equal to the futures price times a bond's factor means (assuming that the factor exceeds one) that, if the price of her cash bonds changes by one point, the price of the futures will change less—by only $1/\mathcal{F}$, of that amount. But if

¹¹ At the expiration of futures, the value basis of the cheapest to deliver bonds must be at or near zero.

this is so, then to get a good hedge—one where any capital losses (gains) on her bonds are matched by capital gains (losses) on her short in futures—the hedge should short $\mathcal{F}$ times as many futures as the face amount of the bonds she wants to hedge. A similar argument holds if the factor is less than one; only it tells the hedger to short an amount of futures less than the face amount of the bonds she wants to hedge.

While hedgers often use a bond's factor to set their hedge ratio, there's a problem with this approach: because of factor bias, this approach exposes a hedger to *more basis risk* than necessary. In Chapter 4, we introduce the concept of the yield value of $\frac{1}{32}$. Let

$$v_{32} = \text{yield value of } \frac{1}{32}$$

$$\text{CTD} = \text{the cheapest to deliver bond}$$

A lower-risk approach for our hedger would be to set her hedge ratio as follows:

$$(\text{Hedge ratio}) = \left[\frac{(v_{32} \text{ on the CTD}) (\mathcal{F} \text{ of the CTD})}{(v_{32} \text{ on the issue to be hedged})} \right]$$

Hedge Example

In Table 16.2, we outline the results of a hedge of the 4 $\frac{3}{8}$ s of August 2012 using the December 2005 10-year T-note contract. The hedge was established on March 1, 2005, and liquidated on December 8, 2005. Chicago Board of Trade delivery factors and yield values of $\frac{1}{32}$ were used to determine the hedge ratios.

Over the life of the hedge, the price of 4 $\frac{3}{8}$ s of 2012 declined by 2-26, or \$28,000 per \$1 million. By comparison, the net loss on the hedged portfolio was approximately \$16,000 per \$1 million of bonds. Over the same period, the December 2005 basis of the 4 $\frac{3}{8}$ s fell approximately by $\frac{46}{32}$, or roughly \$16,000 per \$1 million of bonds ($\frac{46}{32} \times 11 \times \31.25). Thus, by substituting basis risk for market risk, the investor was able to reduce her losses by approximately \$12,000 per \$1 million of bonds held.

BASIS TRADES

When an investor hedges a long position in Treasuries, she ends up, because of the way the contract is written, speculating on the basis, which

TABLE 16.2**Using Treasury futures to create a 9-month hedge*****Step 1: Purchase Treasuries:**

On March 1, 2005, buy for settlement on 03/02/05, \$1 million of the 4%^s of August 15, 2012, for 102¹/₃₂.

Principal amount \$1,025,000

Step 2: Determine hedge using Chicago Board of Trade weighting:

Since we are using the cheapest to deliver, we can use the December 2005 delivery factor of 0.9136 for the hedge ratio. Using the CBOT factor, we would, on March 1, 2005, sell 11 CBOT December 5 10-year note futures contracts at 110³/₃₂.

Step 3: Unwind the hedged investment:

On December 8, 2005, sell for settlement on December 9, 2005, \$1 million of the 4%^s of 2012 at 99-22, or 99.6875.

Principal amount \$996,875

On December 8, 2005, buy 11 CBOT 10-year futures contracts at 109-04, or 109.125.

Step 4: Calculate hedge results using CBOT-weighted hedge investment:

Loss on purchase and sale of the 4%^s of 2012:

Proceeds from sale on December 8, 2005	\$996,875
–Cost at purchase on March 1, 2005	<u>1,025,000</u>
Loss on principal	\$28,125

Gain on CBOT-weighted hedge of 11 CBOT bond futures:

Value when sold on March 8, 2005	\$1,212,750
–Value when purchased on December 8, 2005	<u>1,200,375</u>
Gain on futures	\$12,375

Net:

Loss on principal	\$28,125.00
+Gain on futures hedge	<u>12,375.00</u>
Net loss	\$15,750.00

Note: The December 5 basis for 4%^s of 2012 was 46 32nds on March 2, 2005 and 0.5 32nds on December 8, 2005. The loss (in 32nds) from being *long the basis of the 4%^s of 2012* was:

$$(46 - 0.5) = 45.5, \text{ or } \$15,640.63 [45.5 \times \$31.25 \times 11]$$

which, as should be expected, is approximately the same as the loss on the hedged portfolio using CBOT weights (\$15,750).

*Our example illustrates a hedge of principal. Therefore, we do not consider coupon interest, which of course the investor will earn.

can move up or down over time subject to certain constraints: (1) carry must approach zero as futures expire; (2) the value basis of one or of several cheapest to deliver securities must approach zero as futures expire; and (3) if convergence affects the prices and yields at which the cheapest to deliver or other cheapest issues trade, the prices and yields of other securities must move *pari passu* so that all securities trade at reasonable relationships to one another, given the market environment.

To a trader, basis is simply a synthetic security, the price of which is quoted in 32nds.¹² Any security whose price fluctuates attracts traders. Thus, it isn't surprising that traders began to trade the basis soon after futures were first introduced. Formerly, doing so was awkward: a trader might buy \$1 million or \$2 million of bonds and then try to sell futures where she thought the contract was, but then RMJ, Liberty, Garban, and others began brokering bond bases, and in doing so, they created a tight, liquid market. Today, the quote in a broker's screen for a given basis is very tight; the 10-year basis rarely moves much more than $\frac{5}{32}$ on an ordinary day.

While a lot of basis traders probably think of themselves not as arbing between cash and futures, but rather as buying and selling a *synthetic security*, no such security exists. When the trader's back office clears a buy or a sell of the basis, it must clear two trades, a cash trade and a futures trade. Normally, the futures trade will clear on the trade date, the bond trade the following day. To illustrate, suppose a trader *sells the basis* (*sells bonds and buys futures*) through a broker. The trader on one side of the transaction might say, "Clear my trade through Bear [which among many things is a futures commission merchant (FCM)]," and the trader on the other side might say, "Clear me through Merrill." Since what has been traded is the basis at say, $\frac{12}{32}$, prices must be assigned to the cash and futures legs of the trade in order to clear them. Two constraints limit the prices that may be assigned: (1) the futures price must be within the day's range of prices, and (2) the two prices must together determine a basis of $\frac{12}{32}$.

The futures transaction, which is executed outside the pit, is known as an *exchange for physical (EFP)*. The Chicago Mercantile Exchange (CME) defines EFP transactions as "a privately negotiated and simultaneous

¹² A basis price of 0-16.6 should be read as $\frac{16}{32} + \frac{0.6}{32} = \frac{16.6}{32}$, whereas a price of 1-16.6 would be $\frac{32}{32} + \frac{16.6}{32} = \frac{48.6}{32}$.

exchange of a futures position for a corresponding cash position (i.e., a basis trade) apart from the public auction in the context of a non-interest rate contract.” On an EFP, a trader pays her FCM the normal commission, and the latter clears the trade for her. One beauty of EFPs is that they may be done any time: 24 hours a day, 7 days a week. Nevertheless, they are not presumed to be accepted by the respective clearing houses (such as the CME Clearing House) until they are matched, cleared, and the first payment of settlement variation and performance bond has been confirmed. EFP transactions are considered executed on the same trade day that the two parties conclude the transaction up until the respective clearing houses close for the day.

In an EFP, the party who is selling cash instruments and buying futures is required, for the deal to be legal, to actually own the cash instrument to be delivered. However, dealers are exempt from this requirement. Typically, a dealer who sells the basis, ends up short bonds (since she had no bonds to begin with), and, consequently, she must reverse in bonds via her financing desk to cover her short. The reverse rate she’ll get from her financing desk, the next day when the cash trade settles, is one of the uncertainties she must face.

A trader will sell (short) the basis when she expects it to go in and buy it when she expects it to go out. Table 16.3 presents an example in which a trader sells the basis. The trade in Table 16.3 is in the 4 $\frac{7}{8}$ s of 2012, which in May 2005 was the cheapest to deliver for the June 2005 10-year T-note contract. The trade was put on in the middle of May 2005 and taken off a month later in the middle of the delivery month.¹³ During this period, the basis in the 4 $\frac{7}{8}$ s fell from 9.4 to 0.4 as carry and the time value of the delivery options decayed. When the trade was unwound a month later, the futures contract had only three days left to trade and final settlement was less than two weeks away, so most of the convergence that was going to occur had occurred.

¹³ The dates in this and following examples were selected to illustrate a typical period in which the slope of the yield curve was positive and, thus, so too was carry. As 2005 progressed, the yield curve had inverted; convergence was still occurring but less clearly, because the resulting moves in basis reflected the decay of both *negative* carry and the *positive* value basis.

TABLE 16.3**Cash-futures arbitrage with 10-year Treasury notes****Step 1: Put on the trade:**

1. On March 13, 2005, sell for settlement on May 16, 2005, \$1 million of the 4% of February 15, 2012, at 105-17.

Principal amount	\$1,055,312.50
Accrued interest	<u>12,120.17</u>
Total proceeds	\$1,067,432.67

2. On May 13, 2005, buy 11 CBOT bond futures contracts at 111-31.
3. Invest proceeds from bond sale in a term repo at 2.90% for 31 days to June 15, 2005.

Note: the above transactions are equivalent to *selling the basis of the 4% of 2012* at a price (in 32nds) of 0-09.4.

Step 2: Unwind trade:

1. On June 16, 2005, buy for settlement on June 17, 2005, \$1 million of the 4% of February 15, 2012, at 105-20.

Principal amount	\$1,056,250.00
Accrued interest	<u>16,429.56</u>
Total cost	\$1,072,679.56

2. On June 16, 2005, sell 11 CBOT bond futures contracts at 112-10.
3. On June 17, 2005, close the term repo:

$$\begin{aligned}\text{Interest income} &= (\$1,067,432.67)(0.0290)^{\left(\frac{30}{360}\right)} \\ &= \$2,665.61\end{aligned}$$

Note: the above transactions are equivalent to *buying the basis of the 4% of 2012* at a price (in 32nds) of 0-0.4.

Step 3: Calculate gain on trade:

Gain on sale and purchase of the 4% of 2012:

Proceeds from sale on May 13, 2005	\$1,055,312.50
–Cost at repurchase on June 16, 2005	<u>1,056,250.00</u>
Loss on principal	\$ 937.50

Carry loss:

Interest earned on reverse repo	\$ 2,665.61
–Coupon interest paid	<u>4,309.39</u>
Carry loss	\$ 1,643.78

Gain on purchase and sale of 11 CBOT bond futures:

Value when purchased on May 13, 2005	\$1,231,656.25
–Valued when sold on June 16, 2005	<u>1,235,437.50</u>
Gain on futures	\$ 3,781.25

Continued

TABLE 16.3—cont'd**Cash-futures arbitrage with 10-year Treasury notes****Net gain:**

Loss on principal	\$ 937.50
–Carry loss	1,643.78
Gain on futures	<u>3,781.25</u>
Net gain	\$ 1,199.97

The above transactions are equivalent to the following basis trade
(all prices in 32nds):

Gain (in 32nds) on sale and purchase of the basis of the 4% of 2012:

Sell the basis on May 13, 2005, for	0-09.4
Buy the basis on June 16, 2005, for	0-00.4
Gain on basis	0-09.0

Carry loss (in 32nds):*

Interest earned on repo	0-08.5
–Coupon interest paid	0-13.8
Carry loss	0-05.3

Net gain (in 32nds):

Gain on basis	0-09.0
–Carp/loss	0-05.3
Value of 0.13 futures†	0-00.13
<i>Net gain in 32nds</i>	0-03.83
<i>Net gain in dollars‡</i>	\$1,196.88

*The value of a 32nd is \$31.25 per contract.

†A tail of 0.13 futures arises because we cannot transact fractional amounts of futures. In this case, we can buy only 11 CBOT contracts, not the 10.87 contracts implied by the delivery factor.

‡The difference in the two calculations, \$1,199.97 versus \$1,196.88, is the result of rounding as well as factors related to uncertainties surrounding the precise pricing that would likely have occurred on the trading dates for this simulated transaction, which is based on actual trading levels for the respective trading dates.

Note that the trade was put on using CBOT factors to weight the trade. Some basis traders and many investors may, because of factor bias, prefer to use the approach based on values of that we describe above when we talk about hedging; or they might work with yield values of an 01, which amounts to the same thing (recall Chapter 5).

Although for this example we chose the cheapest to deliver, even if we had chosen another issue, its basis would also have been affected by convergence. The cheapest to deliver issue cannot trade independently of

all other issues; whatever happens to futures, yields on cash bonds must trade in reasonable relationship to one another. If one issue converges, they all must, unless some development affects just a certain issue or issues; for example, in a high-yield environment, high-coupon issues become very expensive, so a high-coupon issue might start to converge and then have its basis go back out because of a rise in yields. Conversely, the basis of a low-coupon issue might move out with a fall in yields.

Basis Trading by a Fully Funded Investor

Our basis-trade examples describe a dealer who must fund with repo any bonds she buys. A portfolio manager who owns bonds can also do basis trades. According to one view, a basis trade is the same trade whether it's done by a leveraged dealer or by a fully funded investor such as an insurance company. The truth is that it is and it isn't. For a fully funded investor, the current "in term" for a basis trade is that it's a *yield-enhancement* trade. This is a slight euphemism: there is always risk associated with a basis trade; and consequently, there's no guarantee that such a trade will only enhance, never lower, yield. Also included in the yield-enhancement category are options strategies. Options are discussed in Chapter 17.

Basis Trading and Bond Liquidity

Basis traders started trading the basis to make money. Incidentally, they changed profoundly the way bonds are traded. *BF*, before futures, a bond trader asked to bid on some off-the-run issue would, if her bid were hit, immediately hedge by shorting some similar issue. Typically, this left her with an illiquid long and an illiquid short, which she'd hope some other bond trader would help her unwind.

Today, a trader can, in the cash market, do huge blocks in current issues without moving the market much, if at all. This is less true of the off-the-run issues. Say a big insurance company comes in and asks a dealer to offer \$200 million of the 6½s of November 2026. If the dealer makes an offer and gets lifted, she's now short; and there's no way that she can go to the cash screens and buy \$200 million 6½s. However, she can go to the basis screen, buy \$200 million of the basis in the 6½s, and then try to buy futures at a price that leaves her a (positive) spread.

Because liquidity is good in the basis market, it's common for traders to price bonds, not just cheap to deliver issues but any issue, on a basis. Dealer to dealer, traders, today, are often just as likely to trade bonds on a basis than to trade them outright. Most customers still want cash bids and offers, but asking for them may not be the way to get the best price. Suppose that the price at which an issue's basis is trading and the futures price together imply that the issue should be priced at 110-4. A dealer might say to a counterparty who wanted an offering and who was willing to trade the basis, "If you want me to offer \$100 million of this issue, the price is 110-8, but if you want it on the basis, the price is 110-5." Here the dealer is saying in effect to the counterparty, "It will cost you $\frac{1}{2}$ if you put me at risk; as I have to go into basis-land, cover, get out of my futures, and do all that other stuff."

Today, a bond trader must also be a basis trader. Recall the example we give in Chapter 14 of a bond trader who was asked by retail to bid on a large block of bonds—\$250 million of them. Since the trader could not immediately sell all those bonds in the cash screens, she immediately shorted some futures. Note that once she did so, she had on a *basis trade*. The only difference between a basis trader who buys the basis and a bond trader who buys bonds and then sells futures, is that the basis trader trades just once through a basis broker whereas the bond trader whose bid is hit is—for the short time it takes her to sell futures—at risk that futures might move against her. This short amount of time should amount to only seconds but prices could move considerably during that time depending upon conditions. For example, a trade that is executed at 8:30 a.m. (ET) could put a bond trader at risk if that is a day when a major economic report is released (most of the major market-moving reports are released at that time of day).

Trading in Foreign Government Bonds

A person not favorably disposed toward finance—and there are such folks—might well look askance at basis trading and related fancy stuff. "What," she might ask, "is the contribution of these new instruments and techniques other than to complicate and add new risks to what was once a simple business: buying and selling cash instruments having no credit risk?"

In this respect, events in the markets for the debt of foreign governments are instructive. One by one, those markets—from Tokyo, to Bonn,

to Paris, began to imitate the mechanisms used in the United States to trade Treasuries. Thanks to gaming laws, Germany initially did not permit domestic trading of futures in Bunds, so futures and basis trading of Bunds first sprang up in London, and the liquidity of Bunds was better for it. Not until 1989 did Japan begin work on setting up a domestic market in repo and reverse. The lack of such a market once impaired the liquidity of Japanese government bonds (JGBs) and in particular precluded arbitrage that would have held rates along the yield curve in line. The absence of a market in repo and reverse in any market causes traders to concentrate their activities on a few active issues, causing the issues to trade at a significant yield concession to the curve. Meanwhile, when other off-the-run issues became expensive, they often stay that way; traders can't short such issues as they would in the United States because they can't cover their shorts with a reverse.

A CALENDAR SPREAD

Another trade people frequently do with bond futures is *calendar spreads*—here, they are making bets about the relative steepness of the yield curve over, say, a 3-, 6-, or 12-month period. They are saying, “I think that the curve is going to invert, so I want to be short [sell] certain calendar spreads,” or, “I think that the curve is going to steepen, so I want to be long [buy] certain calendar spreads.”

Here's an example. In June 2005, a trader could have observed that the curve had been getting flatter, and she might have reasoned that the curve was likely to continue to flatten and then invert. This conclusion might in turn have led her to sell the September-December spread in 10-year T-note contracts in, say, July at 24; that is, sell September futures and buy December futures. Then in September, she might have bought back September-December futures at 19 for a $\frac{5}{32}$ profit, and she might have sold December-March futures at 9. Then in December, she might have closed the December-March futures at 5 for a $\frac{5}{32}$ profit and have sold the March-June futures at 11. All told, she would have made $5 + 5 = \frac{10}{32}$ s on her successive, calendar-spread trades.

Alternatively, our trader might, in July 2005, have reasoned that the curve was going to invert and to stay that way for some time. Suppose that, at that time, she decided that the thing to do was to sell a 6-month spread six months forward. She knew that the September contract was going away soon, so she sold the December 2005-June 2006 spread—a

TABLE 16.4

Buying ("going long") the September-December CBOT 10-year calendar spread

Step 1: Put on the trade:

1. On June 1, 2005, buy 10 CBOT September 10-year futures contracts at $113\frac{30}{32}$.
2. On June 1, 2005, sell 10 CBOT December 10-year futures contracts at $113\frac{00}{32}$.

Note: the above transactions are equivalent to *buying the September-December calendar spread* at $\frac{30}{32}$.

Step 2: Unwind the trade:

1. On July 1, 2005, sell 10 CBOT September 10-year futures contracts at $112\frac{24}{32}$.
2. On July 1, 2005, buy 10 CBOT December 10-year futures contracts at $112\frac{00}{32}$.

Note: the above transactions are equivalent to *selling the September-December calendar spread* at $\frac{24}{32}$.

Step 3: Calculate gain on trade:

Loss on purchase and sale of the 10 CBOT September 10-year futures:

Buy on June 1, 2005, for	113-30
Sell on July 1, 2005, for	112-24
Loss per 10-year future	1-06
Loss on 10 10-year futures*	\$11,875.00

Loss on purchase and sale of the 10 CBOT 10-year December futures:

Sell on June 1, 2005, for	113-00
Buy on July 1, 2005, for	112-00
Gain per bond future	1-00
Gain on 10 10-year futures	\$10,000.00
Net loss:	
Loss on September futures	\$11,875.00
+Gain on December futures	10,000.00
Net loss	\$1,875.00

Note: The above net loss calculation is equivalent to:

Net loss:	
Buy the spread on June 1, 2005, for	0-30
Sell the spread on July 1, 2005, for	0-24
Loss per contract	0-06
Loss on 10 contracts	\$ 1,875.00

*The value of a 32nd is \$31.25 per contract.

profitable move. During the period when the succession of 3-month calendar spreads moved down 10 ticks, the December-June spread moved down approximately 22 ticks.

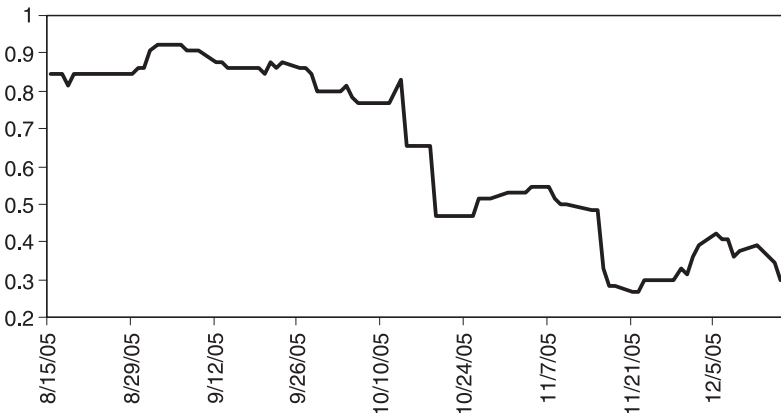
In Table 16.4, we work through the profit and loss calculation for a calendar spread trade. Lest the reader think that traders of futures always make money, we picked for this example a trade that lost money. Figure 16.2 shows how this spread moved during the period covered by the example.

THE NOB TRADE

The *NOB* (*notes over bonds*) trade is a spread trade between note and bond futures. To buy the spread, one buys note futures and sells bond futures; to sell the spread, one does the reverse. Maturity of deliverables excepted, the 10-year note contract is identical to the bond contract. The 10-year contract is the more active, which is why the NOB is often used by people who want to place bets on the relative value of bonds. This has been the case particularly since 2001 when the U.S. Treasury department decided to end its sales of 30-year bonds. Since then, the open interest in the CBOT's 10-year T-note contract has exceeded that of T-bonds. In January 2006, for example, the open interest on 10-year notes was 1.7 million

FIGURE 16.2

The December 2005-June 2006 10-year futures spread (in number of points apart)



contracts; for T-bonds it was 606,000. Open interest in T-bond futures increased to over 700,000 following the Treasury's decision to return to issuance of 30-year bonds starting in February 2006.

As the benchmark contract, the note contract is used by the same sorts of people who use bonds futures: speculators (specs), hedgers, spreaders, and basis traders. However, speculators sometimes prefer the bond to the note contract because the bond contract offers a bigger bang for the buck if a spec is right.

The 5-year note contract is sort of a slimmed down (in terms of trading volume) version of the 10-year note contract, but it is nonetheless quite active; open interest stood at 1.4 million in November 2006. It has, however, one trick: the most recently issued 5-year note is deliverable, and it is issued literally in the month of delivery. That imparts a special aspect to the game of basis trading this contract. A trader must guess what coupon a note that's going to be issued several months hence will have; she must also guess whether that note will be the cheapest to deliver. With market volatility lower in recent years, this hasn't presented much of a problem to traders.

While note futures are often used by dealers to hedge positions in cash instruments—mortgage backs, corporate securities, and so on—a lot of the open interest, especially in the T-bond contract, comes from spreading in the NOB. One way to establish a position in 30-year bond futures is to buy or sell the NOB and then close out the note futures leg of the spread. A local—traders on exchanges buying and selling for their own account—may be unwilling to be in T-bond contracts, but she will do a NOB. The same goes for muni bond futures, only the trade there is called the *MOB* (*munis over bonds*). Volume in muni bond futures has dwindled to almost nothing, and so has trading in the MOB.

Table 16.5 presents an example of a NOB trade, using a weighting that equates the two issues in terms of their price changes for a given change in interest rates. Figure 16.3 shows the movements in the NOB over the relevant period. Going long the NOB is technically going long the curve—it is equivalent to buying 10s and selling 30s. In the example, a NOB with a weight of 1.75 to 1, the weight is roughly the weight of 10 years to 30 years in terms of the value of an 01, using the issues that are the cheapest to deliver for both contracts. Weighted and unweighted NOBs will of course produce slightly different price action, given the differences in duration between notes and bonds.

TABLE 16.5

Buying ("going long") the weighted NOB using a weight of 1.75 on CBOT notes

Step 1: Put on the trade:

1. On November 1, 2005, buy 18 CBOT note futures contracts at 108-05.
2. On November 1, 2005, sell 10 CBOT bond futures contracts at 111-16.

Note: the above transactions are equivalent to *buying the unweighted NOB* at 3-11 and purchasing a "tail" of 8 CBOT note contracts at 108-05.

Step 2: Unwind trade:

1. On December 1, 2005, sell 18 CBOT note futures contracts at 108-11.
2. On December 1, 2005, buy 10 CBOT bond futures contracts at 111-26.

Note: the above transactions are equivalent to *selling the unweighted NOB* at 3-15 and selling the "tail" of 8 CBOT note contracts at 108-11.

Step 3: Calculate gain on trade:

Gain on purchase and sale of the 18 CBOT note futures:

Buy on November 1, 2005, for	108-05
Sell on December 1, 2005, for	108-11
Gain per note future	0-06
Gain on 18 note futures*	\$3,375.00

Loss on purchase and sale of the 10 CBOT bond futures:

Sell on November 1, 2005, for	111-16
Buy on December 1, 2005, for	111-26
Loss per bond future	0-10
Loss on 10 bond futures	\$3,125.00

Net gain:

Gain on note futures	\$3,375.00
–Loss on bond futures	3,125.00
Net gain	\$250.00

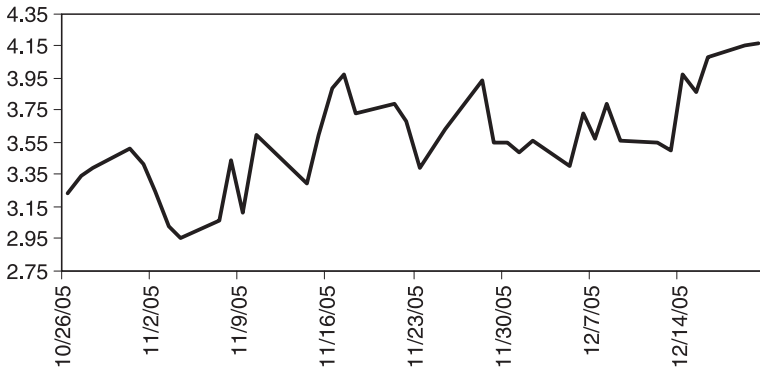
Note: the above net-gain calculation is equivalent to:

Net gain:	
Loss on unweighted NOB	\$1,250.00
+Gain on 8 contract "tail"	1,500.00
Net gain	\$4,375.00

*The value of a 32nd is \$31.25 per contract.

FIGURE 16.3

NOB spread (expressed as bonds minus notes in points)



Also, in a weighted trade, the weights are, because of convexity, good only around where the trade is put on; if the market trades way away—yields rise or fall significantly—the weights change, and a weighted NOB must be reweighted.

A trader can weight a NOB to be bullish or bearish. She can put the trade on saying, “I am bullish, so I’ll weight it as a bullish trade,” which means that she goes long slightly more. A trader always has to round the factors she used to the nearest millions, and she can round them up or down.

A trader might buy a NOB for either of two reasons. First, she might want to mimic a curve trade: she thinks that the curve is going to steepen between 10s and 30s, so she wants to be long 10s and short 30s; that is more a weighted NOB trade. Second, she thinks the market might sell off, and she wants to take advantage of the difference, between the 10s and the 30s, in the value of an 01—of the fact that, if the market sells off, bonds will tend to drop in price faster than 10s. The unweighted NOB trade is more directional: the trader is saying, “If the market is rallying, I want to be short the NOB, but if the market is going to sell off, I want to be long the NOB.”

In our example of a NOB, the market rallied, but the NOB gets wider, which is not standard. Probably, this occurred because, at the time of the trade, the market was adjusting to the reality of continued interest-rate hikes from the Federal Reserve, as well as to the prospect of an

eventual end to rate hikes in 2006. This had the effect of flattening the yield curve, with shorter rates adjusting to the rising fed funds rate, and longer rates betting on an eventual decline in short rates.

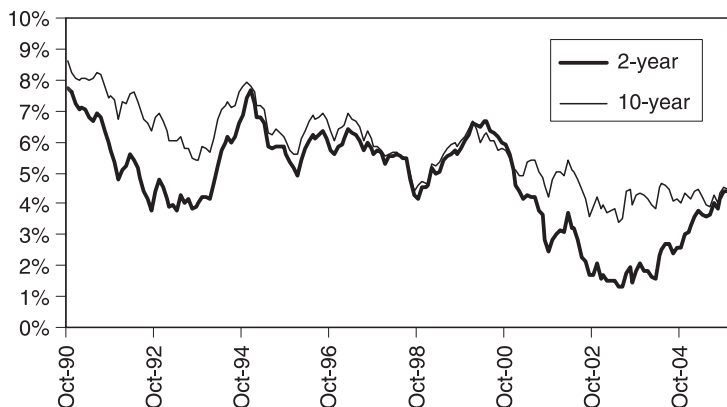
THE TUT TRADE

One of the more popular ways in which investors place bets on future changes in the shape of the Treasury yield curve is by trading the *TUT (tens under twos) spread*. The TUT spread has in recent years become the main gauge by which investors track the yield curve. As Figure 16.4 shows, 2s and 10s are tightly correlated, but the yield spread between the two issues can vary a great deal. This volatility is attractive to traders.

It is common that the 10-year T-note is the benchmark for U.S. interest rates. The 2-year T-note is an often overlooked maturity that may be a better benchmark in terms of capturing market sentiment and forecasting turning points in the bond market. The 2-year note captures market sentiment well because it reflects sentiment toward the Federal Reserve, perhaps better than any other actively traded maturity along the yield curve. This is largely because, over time, the 2-year note has had a fairly stable relationship with the federal funds rate, the rate controlled by the Fed. The main reason is that yields on short-term maturities are determined largely

FIGURE 16.4

2-year T-note versus 10-year T-note



by the cost of money and are not affected nearly as much by factors that dominate the behavior of long-term maturities such as inflation expectations, hedging, speculative flows, and new issuances.

During periods when the yield on the 2-year note has deviated from its historical relationship to the federal funds rate, it has given reliable signals about the bond market's true underlying feelings concerning the direction of monetary policy. The degree to which the yield on the 2-year note gravitates away from the fed funds rate therefore reveals a great deal about market sentiment toward the Fed. This sentiment sometimes reaches extremes owing to either unrealistic hopes for additional interest-rate reductions or unrealistic fears of additional interest-rate increases.

The tight correlation between the 2-year note and the federal funds rate makes it a good vehicle for betting on changes in monetary policy, which plays a central role in fixed-income portfolio strategy. Trading 2s versus 10s is one of the ways in which investors position themselves for changes in monetary policy because the relative value between 2s and 10s is strongly affected by changes in Fed policy. In general, when the Fed is raising rates, the yield spread will narrow; when the Fed is cutting interest rates, the spread will widen.

As with the NOB, the weights that should be applied to each leg of the TUT trade are determined by weighting 2s to 10s in terms of the value of an 01, using the issues that are the cheapest to deliver for both contracts. In November 2006, a weighted TUT spread required that for every 10-year contract traded, an investor would transact 1.69 2-year futures contracts. Weighted and unweighted TUTs will of course produce results that reflect outright price changes rather than weighted price changes as they relate to yield movements.

An important difference between the TUT and the NOB is that the cheapest to deliver can change often, largely because of its short maturity and because new 2-year notes are auctioned every month.

USING FUTURES TO GATHER MARKET INTELLIGENCE

One of the most important elements in investing is having an accurate assessment of market expectations. If an investor's assumptions regarding market expectations are wrong, an accurate forecast of market fundamentals won't necessarily translate into successful investment strategies. Successful strategies are those that capture investments that do not yet

fully capture, or discount, events in the future. It's therefore imperative for investors to estimate as accurately as possible the market assumptions embedded in market prices.

The futures market is a rich source of information that can be useful in assessing investor sentiment.

Tracking Market Sentiment

There are five main indicators of market sentiment that can be found in the futures market:

- Open interest
- Futures trading volume
- Options trading volume
- The CFTC's (Commodity Futures Trading Commission) Commitments of Traders report
- The bond basis

Open Interest

Open interest is a measure of the total number of futures positions that remain open, or outstanding, at a given time. For each open contract there's a long and short position held by two different parties, but the respective positions are counted as a single contract in the open interest data. Open interest data can be used to gauge the quality of a move in the respective market. The main way to use this gauge is to compare the daily changes in open interest to the direction of the futures price. In general, when open interest increases on a day that prices rally, this is seen as an indication that new long positions were probably behind the rally rather than "short covering," which occurs when short positions are closed. It's seen as a sign that market participants are confident that prices will continue to rise.

On the other hand, when open interest declines on a day that prices rally, this is seen as a sign that the rally may have been spurred by short covering instead. This is seen as indicating that the rally may not be sustainable. This is because prices can increase only so much on short covering alone; new buyers will eventually be needed to sustain higher prices.

Similarly, when prices decline and open interest increases, this is seen as an indication that new short positions likely spurred the drop in price.

TABLE 16.6

Interpretation of changes in open interest

Price Direction	Open Interest Change	Interpretation	Reason
Rising prices	Increasing	Bullish	Pattern suggests new longs entered the market
Rising prices	Decreasing	Bearish	Pattern suggests rally caused by short covering rather than new long positions
Falling prices	Increasing	Bearish	Pattern suggests new short positions established
Falling prices	Decreasing	Bullish	Pattern suggests sell-off caused by long liquidations that will eventually be exhausted

This is seen as indicating that market participants expect continued declines in prices. When open interest declines as prices fall, this is seen as an indication that investors with existing long positions liquidated their positions. Liquidations of long positions can't continue in perpetuity, of course, so it's usually only a matter of time before the liquidations are exhausted.

Table 16.6 serves as a useful reference for the conventional interpretation of changes in open interest.

Futures Trading Volume

A key gauge in most asset classes, trading volume is often used in the bond market to gauge the degree of investor participation that occurs amid particular price moves. A price move that occurs on strong volume helps to validate that move and suggests that prices will continue to move in the same direction. But a price move that occurs in light volume suggests that there's very little sponsorship for that price move and that the move will not likely be sustained.

It's especially critical to track volume when a price trend is well established. In such a case, diminishing volume could be a red flag and could portend a reversal or a consolidation of the trend. High levels of volume tend to be associated with increases in commercial activity relative to speculative activity, while low volume levels suggest the opposite.

Commercial players are considered “smart money” and speculative traders tend to trade on momentum, making this camp more likely to change positions depending upon market movement. One can track the activity of these two camps more specifically by using the CFTC’s Commitments of Traders (COT) report, discussed below. Tracking volume in the futures market is especially important in the bond market where there are no other official sources of data on daily volume in the cash market. That said, the New York Fed publishes volume data, but only on a weekly basis, typically lagged by about a week. Volume in the cash market, by the way, ran at around \$600 billion per day in the middle of 2006, according to the New York Fed.

Options Trading Volume

Options volume can be used as a contrary indicator that helps in predicting turning points in the bond market. Specifically, by comparing the daily volume in calls to the daily volume in puts, one can spot excesses in bullish and bearish sentiment in the market. This is an excellent indicator that is also used in the stock market, using stock options, of course. One of the reasons that options volume is such a good indicator is that it captures speculative activity very well, and it’s the speculative activity in particular that one wants to capture when tracking market sentiment. The *speculative activity* is the activity that results from the collective views of short-term traders who have a tendency to bet wrong on market direction, especially at turning points.

In the bond market the best way to track market sentiment is to track the activity in the options on Treasury futures that trade at the Chicago Board of Trade. Although the future issuance of Treasury bonds was reduced at the end of 2001 when the Treasury department announced elimination of the issuance of 30-year bonds, there remain many billions of dollars of bonds outstanding, and there’s still a large degree of speculative activity in T-bond contracts. Still, it is best to track the volume in 10-year T-notes given that they are the benchmark for the U.S. Treasury market.

The volume in calls is compared to the volume in puts using a 10-day average of the call/put ratio. This ratio has provided many reliable signals of overbought and oversold conditions in the bond market. Over time, the ratio has averaged close to about 1:1, although in 2005 it averaged around 0.90:1. When the ratio rises sharply above its long-term average, this is seen as a sign of excess bullishness and hence a possible precursor

to a market decline. Conversely, when the ratio falls sharply below its 1-year average, it could be a sign of excess bearishness and hence a possible harbinger of a rally.

The CFTC's COT Report

A telling indicator of speculative activity in the bond market can be found in government data on the futures market compiled weekly by the CFTC in its COT report. The COT report basically sums up and categorizes the holders of futures positions in all existing U.S. futures contracts, including futures for U.S. Treasuries. The COT report is useful for determining the extent to which recent activity in Treasury futures has been driven by speculative or commercial activity.

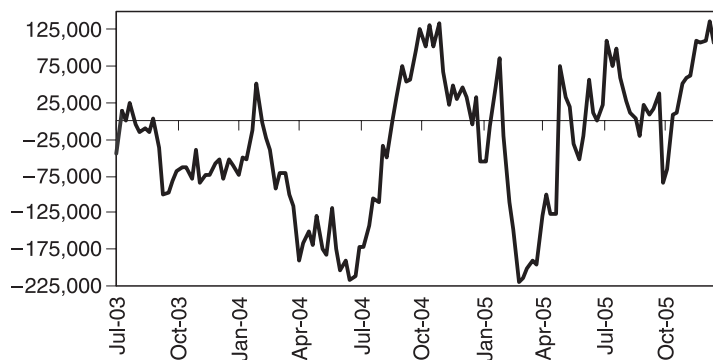
The CFTC separates the holders of Treasury futures into two main groups: commercials and noncommercials. Commercial traders in Treasuries are the true end users of the contracts: the hedgers and those who are in the business of buying and selling fixed-income securities. Commercial traders are known as “smart money.” They can be primary dealers, insurance companies, pension funds, and the like. Noncommercials are considered speculators. This is the group to watch.

Market tops and bottoms frequently have been foreshadowed by extreme positions taken by noncommercial traders. This is the case largely because speculative traders have relatively less information in hand than do commercial traders with respect to market fundamentals and the true level of underlying demand for fixed-income securities. In addition, speculators frequently have a herd mentality and are therefore more likely to alter their positions when commercial players ignite a change in the market's direction. Moreover, speculators have a tendency to accumulate relatively large positions toward the end of a market trend, when they allow human nature to get the best of them by letting the profit motive dictate their actions. As a group, the noncommercial traders are most definitely among those people who give too much weight to their most recent experience and extrapolate recent trends that are at odds with long-run averages and statistical odds. Speculators tend to remember their successes more than their failures, hence prompting them to take increasingly higher levels of risk.

Figure 16.5 shows the net positions in 10-year Treasury futures held by noncommercial traders. As can be seen, the positions can swing sharply from long to short, and vice versa. Take note of two particular periods, the extreme net short positions in June 2004 and March 2005.

FIGURE 16.5

Net position held by noncommercial traders in 10-year T-note futures (number of contracts)



In both cases the large collective net short positions were signs of excessive bearishness in the Treasury market, and both periods were followed by relatively large gains in Treasury prices. For example, it is notable that, for the 10-year T-note, the closing high yield in 2004 was set on June 14 at 4.872%. That was just a few weeks before the collective net short held by speculators in 10-year T-note contracts had reached the extreme shown in the figure. Three months later the 10-year contracts were trading at under 4%. In other words, the CFTC's data were a terrific contrary indicator for the rally that took place. Similarly, the rally in Treasuries that took the 10-year from 4.64% (just 2 basis points below the year's high) in March 2005 to under 4% three months later was foreshadowed by the record net short position held by speculators the very same week Treasury yields peaked. These are just two examples of many similar episodes.

The Bond Basis as a Sentiment Indicator

As shown earlier, the Treasury basis tracks the price of cash bonds compared to futures prices. The basis can be used as a tool to explain divergences in performance that aren't easily explained by differences in duration, particularly with respect to the degree of commercial activity that is compared to that of speculative activity. This is important because market trends that are based on commercial trading activity are more likely to be sustained than those that appear to be rooted in speculative activity. Since most of the speculative activity in the bond market takes

TABLE 16.7

Interpretation of the behavior of the bond basis

Price Direction	Basis Change	Interpretation	Reason
Rising prices	Widening	Bullish	Pattern suggests new commercial buyers behind the rally
Rising prices	Narrowing	Bearish	Pattern suggests commercial players are not supporting rally
Falling prices	Widening	Bullish	Pattern suggests speculative activity causing the weakness
Falling prices	Narrowing	Bearish	Pattern suggests sell-off caused by commercial selling

place in the futures market, the performance of the cash market relative to the futures market can be used to track the degree to which commercial players are supporting a particular market trend. Thus, if bond prices rise and the basis narrows as a result of the futures market outperforming the cash market, this would indicate that futures, or speculative, activity, not commercial activity, led the market higher. This is a low-quality rally and is thus less likely to be sustained. Similarly, if bond prices decline but the basis widens, this would indicate that futures, or speculative, activity is driving prices, not commercial activity. Keep in mind that the basis can sometimes shift because of shifts in the yield curve, which result from changes in the issue that is cheapest to deliver.

Table 16.7 provides the various interpretations of the behavior of the bond basis.

REVIEW IN BRIEF

- Treasury futures have been traded since 1977 and were the most popular financial futures contract until the Eurodollar eventually displaced it. Changes in the Treasury's auction calendar in 2001 elevated the 10-year contract to benchmark status and made it the most actively traded Treasury contract.

- The delivery provisions for Treasury futures contracts have a major bearing on the pricing of Treasury futures. Treasury prices will track the so-called cheapest to deliver, which can change when interest rates fluctuate.
- The CBOT assigns conversion factors to Treasury securities in order to enable shorts to deliver contract-grade Treasury securities with any coupon—high or low—on equitable terms.
- The Treasury basis is the difference between the price at which a bond trades in the cash market and the (invoice) price at which it is valued (could be sold) for forward delivery in the futures market. In essence, it is the difference between a bond's cash market price and its (forward) present value in the 6% world of futures.
- Cash and futures prices will tend to converge when the delivery date for futures approaches, as carry decays to zero.
- Treasury futures are widely used as a hedging vehicle in the various segments of the bond market, including the mortgage and corporate securities markets.
- Futures are also used as a vehicle for boosting the returns of fixed-income portfolios via strategies designed to take advantage of volatility in the interest-rate environment, yield curve shifts, and so on. Calendar spreads and the NOB and TUT trades are just a few of the strategies that are often used.
- The futures market is a rich source of information that can be useful for assessing investor sentiment.

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Financial Options

Jack Bao
Alex Edmans

An *option* is the right, but not the obligation, to trade a specific underlying asset for a predetermined price, known as the *strike price* or *exercise price*. Common underlying assets include a stock, bond, index, currency, or commodity. A *European option* can be exercised only at a prespecified date, known as the *expiration date* or *maturity date*; whereas an *American option* can be exercised at any time up to and including the maturity date.

There are two parties to every option transaction. The holder (buyer) is the party that owns the option to trade (*long* the option). The writer (seller) is *short* the option and therefore has a contingent obligation: he is forced to make the trade if the option holder chooses to exercise the option (Figure 17.1).

CALL OPTIONS

Standard options come in two main forms. A *call* option gives its owner the right to *buy* the asset at the strike price, either at the maturity date

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FIGURE 17.1

Puts and calls: rights, contingent obligations, and features

A. Rights and contingent obligations		
		Type
Party	Put	Call
Buyer	Right to sell	Right to buy
Seller	Contingent obligation to buy	Contingent obligation to sell

B. Identifying the features of an option

1. Is the option a put or a call?
2. What's the underlying asset—a stock, bond, index, currency, or commodity?
3. What's the option's strike price?
4. What's the option's expiration date?
5. When can the option be exercised?

(European call) or up to the maturity date (American call). Let's consider an example. I own a European call on Lehman with an exercise price of \$80, expiring one year from now. Whether I decide to exercise the option will depend on the Lehman stock price at maturity. If Lehman is trading above \$80, I will indeed exercise the option: I can buy the stock for \$80 and immediately sell it on the market for a higher price, and my *payoff* is the difference. But if Lehman is trading below \$80, I will not exercise the option. There is zero value in having the option to buy the stock for \$80 when I could buy it in the market for less.

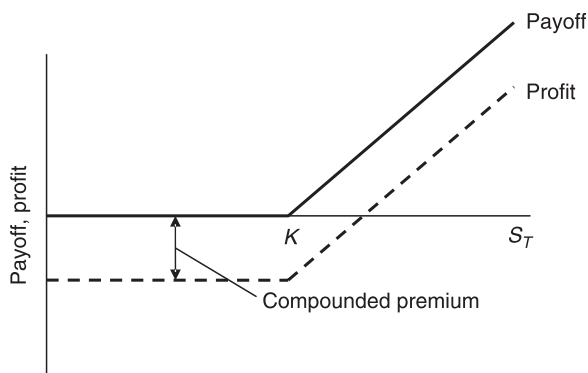
More generally, let S refer to the price of the underlying asset (Lehman stock in the above example) and K be the strike price. T is the maturity date; therefore S_T is the value of Lehman stock at maturity. Then the option's payoff is given by:

$$\text{Payoff} = \begin{cases} S_T - K, & \text{if } S_T > K \\ 0, & \text{if } S_T \leq K \end{cases}$$

Combining these gives the payoff at maturity as $\max(S_T - K, 0)$. The payoff diagram is shown by the thick solid line in Figure 17.2.

FIGURE 17.2

Payoff and profit to a long call at maturity



The payoff structure of an option is therefore fundamentally different from holding the underlying asset. The call holder benefits fully from rises in the stock price, just as a shareholder would. However, unlike a shareholder, he bears limited downside risk: if the stock price falls below the strike price, he can simply let the option expire unexercised. Hence the overall payoff function is asymmetric. A similar comparison can be made with forwards and futures. The holder of a forward or futures contract is obligated to purchase the asset for the predetermined price at maturity, but the holder of an option can choose whether to make the trade.

Given that the payoff is either zero or positive, why doesn't everyone simply buy options? The reason is that an option costs money to begin with: the initial price is known as the option's *premium*. (Later in this chapter we discuss how the premium is valued.) Therefore, the *profit* to an option is calculated by deducting the future value of the premium from the payoff. (We must compound the premium at an appropriate interest rate because the premium is paid upon purchase, but the option's payoff is not received until maturity.) Thus the profit for an option can be negative, as shown by the dashed line in Figure 17.2. A buyer of a call is therefore optimistic about the underlying asset: he hopes

that it will rise sufficiently high above the strike price to recoup the initial premium.

Since options are a contract between two parties, they are a *zero-sum game*: the holder's gain is the writer's loss. The best that the call writer can hope for is $S_T < K$ so that the option is not exercised and so that his payoff is zero. His profit, therefore, equals the compounded premium. If, instead, $S_T > K$, the holder will exercise and the writer will lose the difference. Overall, the option's payoff is given by:

$$\text{Payoff} = \begin{cases} K - S_T, & \text{if } S_T > K \\ 0, & \text{if } S_T \leq K \end{cases}$$

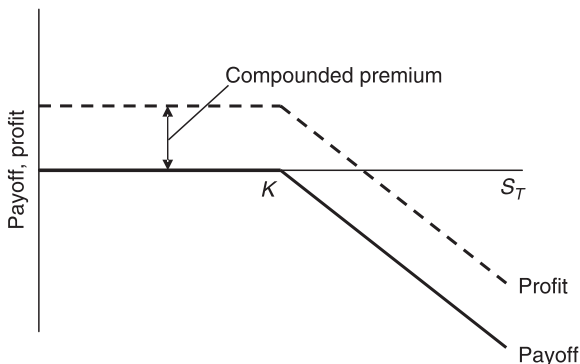
Combining these gives the payoff at maturity as $\min(K - S_T, 0)$. The profit and payoff diagrams are shown in Figure 17.3. A seller of a call is therefore pessimistic about the underlying asset: he hopes that the stock will end up below the strike price, and so he pockets the initial premium with no future liability.

PUT OPTIONS

The second main type of option is a *put* option, which gives its owner the right to *sell* the asset at the strike price. The analysis is analogous to that

FIGURE 17.3

Payoff and profit to a short call at maturity



for a call, except now the option holder exercises if and only if the stock price is below the strike price at maturity. His payoff is:

$$\text{Payoff} = \begin{cases} 0, & \text{if } S_T > K \\ K - S_T, & \text{if } S_T \leq K \end{cases}$$

or $\max(K - S_T, 0)$. The payoff to the put writer is given by

$$\text{Payoff} = \begin{cases} 0, & \text{if } S_T > K \\ S_T - K, & \text{if } S_T \leq K \end{cases}$$

or $\min(S_T - K, 0)$. The profit and payoff diagrams are given in Figures 17.4 and 17.5, respectively. A holder of a put option is thus pessimistic about the underlying asset, whereas the put writer is optimistic.

Note that a put is *not* the reverse of a call. Puts and calls are *two distinct* instruments, each of which may be bought or sold. The payoffs to a short call and long put are very different. Thus, whereas futures quotes give one price per instrument per period, options quotes give—for each strike price and for each expiration date—potentially *two* prices: one for the relevant call and one for the relevant put. For example, Table 17.1 shows that *The Wall Street Journal* quoted, for February 17, 2006, one price for the March futures contract on the Dow Jones Industrial Average (DJIA).

FIGURE 17.4

Payoff and profit to a long put at maturity

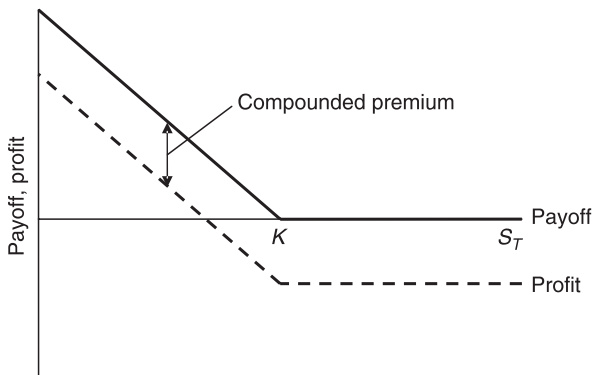


FIGURE 17.5

Payoff and profit to a short put at maturity

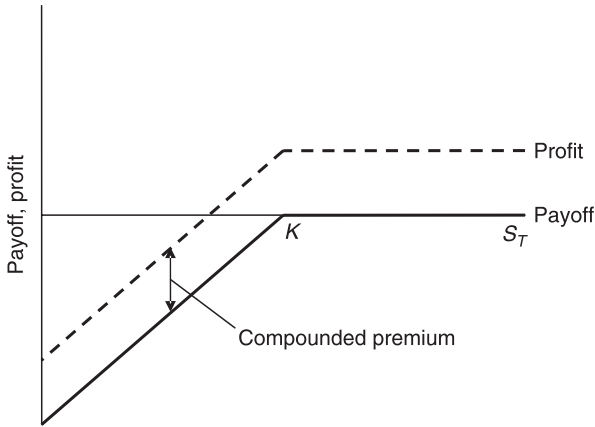


TABLE 17.1

Price quotes of futures and options

<i>Futures</i>								
Index Futures								
	Open	High	Low	Settle	Chg	Lifetime		Open int.
						High	Low	
DJ Industrial Average(CBT)—\$10 × Index								
Mar	11072	11133	11057	11129	58	11133	10257	40,092
June	11160	11205	11137	11201	59	11205	10363	199
Mini DJ Industrial Average(CBT)—\$5 × Index								
Mar	11075	11133	11059	11129	58	11133	10238	90,948
June	11151	11220	11130	11201	59	11220	10608	221
Mini Nasdaq 100(CME)—\$20 × Index								
Mar	1679.5	1698.0	1677.50	1695.5	16.0	1774.0	1539.0	353,122
June	1700.5	1715.0	1697.0	1714.0	16.0	1793.0	3662.0	330

TABLE 17.1—cont'd

Price quotes of futures and options

	Open	High	Low	Settle	Chg	Lifetime		Open int.
						High	Low	
Russell 1000(NYBOT)–\$500 × Index								
Mar	699.25	703.40	699.10	703.50	5.60	708.45	681.00	89,063
U.S. Dollar Index(NYBOT)–\$1,000 × Index								
Mar	90.70	90.94	90.62	90.62	–.03	92.20	86.00	27,654
June	90.26	90.53	90.30	90.27	–.03	91.65	86.23	2,284
FRIDAY, FEBRUARY 17, 2006								

INDEX OPTIONS TRADING

Thursday, February 16, 2006

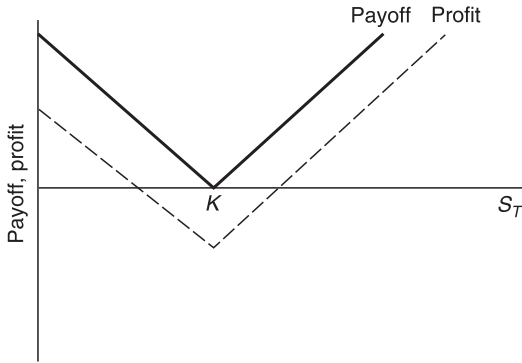
Volume, last, net change and open interest for all contracts with volume of at least 50. Open interest reflects previous trading day.
p-Put c-Call. The totals for call and put volume are midday figures.

CHICAGO

STRIKE		VOL	LAST	NET CHG	OPEN INT
DJ INDUS AVG(DJX)					
Mar	94c	150	16.70	-	-
Mar	102c	66	9.30	1.80	693
Feb	104c	225	6.70	0.50	1,119
Mar	104p	176	0.15	–0.05	11,448
Feb	105c	601	6.20	0.80	15,114
Mar	105c	600	6.30	0.60	5,335
Feb	106c	55	4.90	0.90	7,309
Mar	106p	338	0.20	–0.10	6,793
Feb	107c	134	3.80	0.80	6,613
Mar	108c	165	3.50	0.50	33,338
Mar	108p	332	0.45	–0.10	26,656
Apr	108c	50	4.10	0.30	1,692
Mar	109c	162	2.70	0.25	20,382
Mar	109p	223	0.55	–0.20	21,946
Apr	109p	320	1.10	–0.25	2,263
Feb	110p	706	0.05	–0.10	17,656
Mar	110p	939	0.75	–0.30	25,434
Apr	110p	108	1.35	–0.30	376
Apr	111p	94	1.65	–0.55	609
Feb	112c	95	0.05	—	9,900
Mar	112c	90	0.80	0.10	14,460
Mar	112p	183	1.55	–0.50	229
Apr	112c	287	1.70	0.20	12,502
Apr	112p	56	2.10	–0.40	633

FIGURE 17.6

Payoff and profit to a straddle



However, under the heading “Index Options” it quoted prices for six calls and six puts on the DJIA that expire in March. In particular, note that for strike prices 108, 109, and 112 there are both put and call quotes.

COMBINING OPTIONS¹

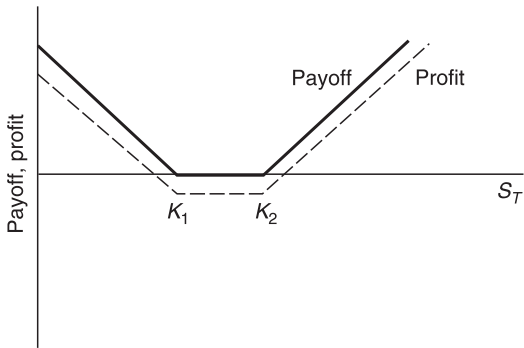
By forming portfolios of options, it is possible to create strategies that bet on movements of the underlying asset. Suppose we believe that a stock is extremely risky and will have a large rise or fall in value, but we do not know in which direction. We could buy a call and a put at the same strike price. This combination of options is known as a *straddle* (Figure 17.6). Alternatively, we could long a call with a strike above the current value of the underlying asset and long a put with a strike below the current value of the underlying stock. This is known as a *strangle*. Figure 17.7 illustrates the payoff to a strangle where the put has strike price K_1 and the call has strike price K_2 . Instead, suppose we believe that the value of the underlying asset will not change much. We could form a portfolio known as a *butterfly spread* (Figure 17.8). Such a strategy involves a long position in call options at K_1 and K_3 and a short position of two call options at K_2 .²

¹ There are numerous positions other than the ones discussed here that can be formed from a portfolio of options.

² An alternative way to bet on the underlying asset not moving much is to short a straddle or a strangle.

FIGURE 17.7

Payoff and profit to a strangle



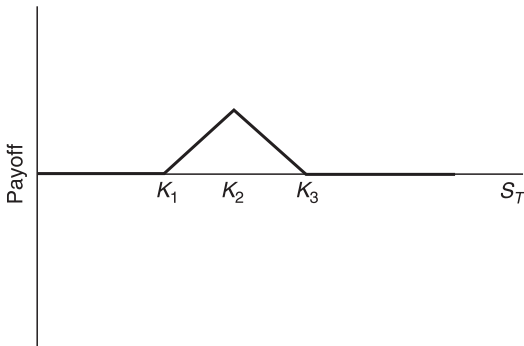
OPTIONS TRADING

Whereas new stocks have to be issued by a company to be traded, two investors can trade options with each other without the company even knowing (the same applies to forwards and futures). An option can therefore be thought of as a “side bet” between two investors, and so in theory anyone can create an option just like anyone can place a bet on a soccer match.

Options can be traded in two main ways. The first is over the counter (OTC). This kind of trade can be customized to meet the particular views and needs of the buyer and seller in question. The second is via an exchange. For options to be traded on a large exchange, their terms and conditions have to be standardized so that a buyer can be certain of what he is buying

FIGURE 17.8

Payoff to a butterfly spread



even though he may not know his counterparty. (Standardization similarly allows commodities such as oil and wheat to be traded on large exchanges.) Exchange-traded options tend to be significantly more liquid than OTC options and thus involve lower transactions costs; however, OTC options are preferred if the parties seek terms different from those available in the standard contracts.

THE VALUE OF AN OPTION

The option premium (i.e., its price or value) consists of two parts. The first part is *intrinsic value*: the value if the option expired today at time $t = T$. This is given by the solid lines in Figures 17.2 and 17.4 and is $\max(S_T - K, 0)$ for a call and $\max(K - S_T, 0)$ for a put.

A call option is said to be *in-the-money* if $S_T > K$; that is, if its intrinsic value is positive, so that it would be worth something if exercised today. It is *at-the-money* if $S_T = K$, and *out-of-the-money* if $S_T < K$. Similarly, a put option is in-the-money if $S_T < K$ and out-of-the-money if $S_T > K$.

If the option expired today, its premium would equal the intrinsic value. However, if the option has some time to expiry, it also possesses *time value*. The main source of time value is the asymmetric nature of the payoffs. Greater time to expiry gives the underlying asset greater opportunity to change. If it appreciates, a call holder benefits fully, but his loss if the asset falls in value is limited: if it falls below K , the payoff cannot fall below 0.

Time value is greatest for a call that is at-the-money. Its intrinsic value is zero, but its overall value will be strictly positive: if the stock price falls, the intrinsic value cannot fall; but if it rises, the holder receives a positive payoff. Time value is smallest when the option is *deep in-the-money* or *deep out-of-the-money*. In the former case, since the holder is likely to exercise the option even if S_T falls significantly before maturity, the asymmetry is largely removed. In the latter case, the option is likely to remain unexercised even with a sizable move in S_T . (The same arguments hold for put options.)

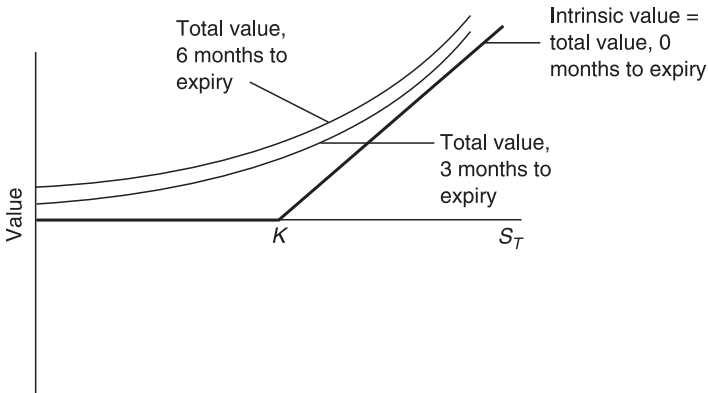
As an option approaches expiration, its time value is said to *decay*, and the total value approaches the intrinsic value. Figure 17.9 illustrates.

BASIC USES OF OPTIONS

The asymmetric payoff diagrams shown in Figures 17.2 and 17.4 suggest why an investor might choose to purchase an option rather than a forward or the underlying asset.

FIGURE 17.9

The time value of an option is greater the closer the underlying asset is to the strike price and the longer the time to maturity



Speculation

Options allow an agent to speculate on price movements while limiting downside risk. For example, assume Morgan Stanley's stock is \$50 today, and you think it will go up to \$80 by the end of the year. There's a risk that it may fall to \$30. Assume a call with $K = \$50$ is selling for \$10.

If you buy the stock, you risk the price falling to \$30, and you will bear the \$20 loss. By contrast, by buying an option, your loss is capped at the initial premium of \$10: your terminal payoff can never be negative because you can simply choose not to exercise the option.

You might think that the option is a "safer" way to speculate on a price movement, because the downside is capped. However, an option is in fact *riskier* than the underlying asset when we consider percentage, rather than dollar gains and losses as shown in Table 17.2.

In percentage terms, downside risk is *greater* because the option buyer can lose his entire investment if the option ends up out of the money, whereas a shareholder nearly always obtains a positive payoff. In addition, upside potential is greater in percentage terms since an option is cheaper than the underlying asset.

It's the percentage of gains and losses that are more relevant, because you can always "scale up" an option position to involve the same initial investment as the stock position. If you have \$50 to invest in a trade on Morgan Stanley, you can either buy one share (gaining \$30 or losing \$20) or five options (gaining \$100 or losing the entire \$50).

TABLE 17.2

Profit and loss to an option and the underlying stock

	<i>Terminal Stock Price</i>	
	\$80	\$30
Profit to buying call option	= \$80 – \$50 – \$10 = \$20 (+200%)	–\$10 (–100%)
Profit to buying stock	= \$80 – \$50 = \$30 (+60%)	= \$30 – \$50 = –\$20 (–40%)

As will be seen when we discuss valuation, a call is a *levered* position in a stock: it can be replicated by owing a share and borrowing. This leverage means that the call is more sensitive than the underlying asset itself.

Insurance

The media often portray options as dangerous devices that subject the economy to unnecessary risk. In fact options are far more extensively used to reduce risk than to speculate. An agent already exposed to the risk of the underlying asset can reduce unwanted exposures by using options.

Suppose you are the CEO of an airline. The current oil price is \$50 per barrel. You are afraid that it may rise to \$60 per barrel by the end of the year. You are not certain that the oil price will rise, and you wish to benefit if the oil price actually falls.

Buying a call option on oil is an effective way to achieve this. If the call option has a strike price of \$50 and if the oil price rises, you will exercise your option to buy oil at \$50 rather than having to pay the high market price. But if it falls, you can simply allow the option to expire and buy oil on the market. The call option thus provides insurance against an oil price rise. This explains why the price of the option is called a *premium*: it is analogous to an insurance premium.

VALUING AN OPTION

Finding the exact value of an option is highly complex. Many finance professors spent several years trying to solve this problem before Fisher Black and Myron Scholes published the Nobel prize–winning Black-Scholes options pricing formula in 1973. The derivation of the formula requires

stochastic calculus and is beyond the scope of this book. However, we can get surprisingly far just by employing no-arbitrage rules and simple arithmetic. First, we will learn the famous put-call parity relationship that links the prices of a put, call, stock, and bond. Next, we can derive exact prices for options in a binomial framework either by replicating the option using stocks and bonds or by using risk-free pricing.

Put-Call Parity

Let C be the price of a call option and P be the price of a put option. Two restrictions on option prices follow immediately from the payoff diagrams. The first is that $C \geq 0$ and $P \geq 0$ must hold at all times, since the payoff to an option is at least zero. If this were violated, you could make money risk-free by buying an option with a negative price. Second, a call can never cost more than the underlying asset: $C \leq S$. A stock can be seen as a call option on a stock with a strike price of zero, since the owner needs to pay nothing more to own the stock. Hence a call option with a positive strike price cannot be worth more than the underlying asset.

Less obviously, we can derive an exact relationship between European calls and European puts on non-dividend-paying stocks. Consider two portfolios:

- A. Buy a European call option with strike price K , and invest $K/(1 + r)^T$ in a risk-free bond.
- B. Buy the underlying stock at its current price S_0 , and buy a put option on the stock with strike price K .

Hold both portfolios until expiration. Both strategies will have identical payoffs, regardless of the stock price at maturity, as shown in Table 17.3 and Figure 17.10.

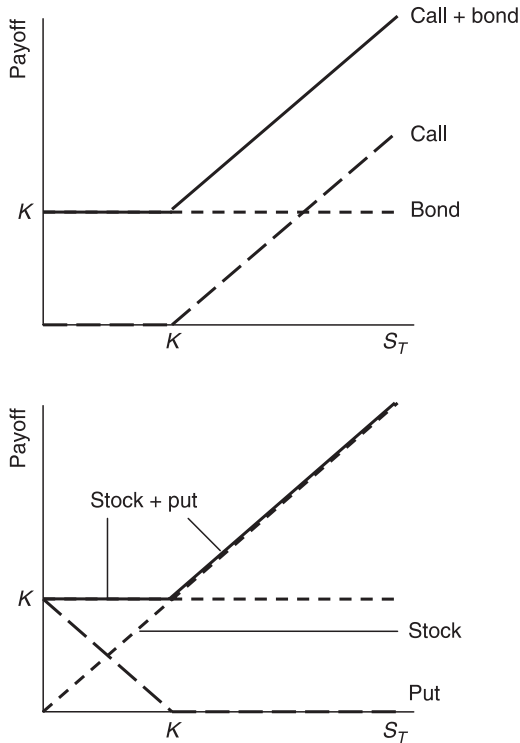
TABLE 17.3

Call plus bond gives same payoff as put plus stock

Portfolio	Initial Cost	Payoff	
		$S_T > K$	$S_T \leq K$
A	$C + K/(1+r)^T$	$S_T - K + K = S_T$	$0 + K = K$
B	$S_0 + P$	$S_T + 0 = S_T$	$S_T + K - S_T = K$

FIGURE 17.10

Call plus bond gives same payoff as put plus stock



Therefore, they must cost exactly the same today. Hence:

$$C + \frac{K}{(1+r)^T} = S_0 + P$$

Replication

The intuition behind the replication approach is that we can exactly match the payoffs of an option over the next instant by holding appropriate positions in the underlying asset and a risk-free asset. As mentioned earlier, a call is like owning a stock and borrowing. Since we know the price of

the stock and bond, we can easily calculate the cost of the replicating portfolio. The call must cost exactly the same.

Let us try to value a European call with an IBM stock. Currently, $S = \$90$, $K = \$95$, $T = 1$ year, r (the risk-free rate) = 5% per year. Assume that the stock can either rise by 10% or fall by 20% over the course of the year.

First, we construct the payoff diagrams to each of the three assets: the stock, bond, and call. The diagrams in Figure 17.11 are the simplest form of a *binomial tree*. It is binomial since it is assumed that there are only two payoffs at the end of each period. “Branches” depict the possible price paths over the period.

Next, we construct a replicating portfolio of stocks and bonds that gives the same payoff as the call in both states of nature (the “up” state and the “down” state). Let us use Δ stocks and B dollars in the bond. It must therefore solve:

$$\Delta 99 + B (1.05) = 4$$

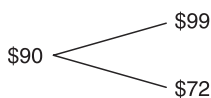
$$\Delta 72 + B (1.05) = 0$$

Solving these simultaneously gives $\Delta = 0.148$ and $B = -\$10.16$. Hence 0.148 shares of IBM and \$10.16 borrowed at the risk-free rate perfectly track the option.

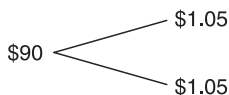
FIGURE 17.11

Payoff diagrams

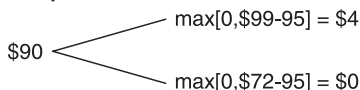
Stock



Risk-free bond



European call



More generally, we find the tracking portfolio by solving

$$\begin{aligned}\Delta S_u + B(1+r) &= C_u \\ \Delta S_d + B(1+r) &= C_d \\ \Rightarrow \Delta &= \frac{C_u - C_d}{S_u - S_d}\end{aligned}$$

where S_u is the value of the underlying asset in the up state, and S_d is the value of the underlying asset in the down state. C_u and C_d are the call values in the two states.

The replicating portfolio costs $0.148 (\$90) - \$10.16 = \$3.16$. Hence the call option must cost \$3.16 also, by no arbitrage. What would happen if the call cost only \$3, for example? We would be able to construct an arbitrage, by buying the call and selling the synthetic call constructed with 0.148 shares and $-\$10.16$ bonds (see Table 17.4).

This is an arbitrage: you receive \$0.16 today and have no liability tomorrow—regardless of the stock price.

You may be surprised to see no mention of the probabilities of the up and down states, nor any mention of risk-aversion or a risk-adjusted discount rate in the above pricing. Probabilities do not matter because the arbitrage holds regardless of the probabilities, since you have no future liability *regardless of the stock price*. How does this square with the intuition that a call will obviously be more valuable if the “up” state is

TABLE 17.4

Arbitrage of an underpriced call

Buy one option				-\$3
Lend \$10.16				-\$10.16
Short sell 0.148 shares				+\$13.32
Total cash today				+\$0.16
State	Call	Bond	Stock	Overall
Up	+\$4	+\$10.66	-\$14.66	\$0
Down	\$0	+\$10.66	-\$10.66	\$0

more likely? If this is the case, the current stock price will be higher, and S is indeed a parameter in the call value. Probabilities affect *only* the price of the call through their effect on S , so they do not enter into the pricing equation independently.

Similarly, risk aversion is irrelevant because the arbitrage is risk-free in every state of nature. How does this square with the intuition that the call provides a risky payoff and that a buyer would expect to be compensated for the risk? Again, risk aversion enters only through its effect on S : if the market as a whole is more risk averse, then S will fall because its future payoffs will be discounted at a higher rate.

It may seem that the above method is highly unrealistic, because IBM's stock price can take far, far more than two values at the end of one year. To obtain a more accurate answer, we can extend the branches of the tree and shorten the time period between each node. For example, we could have 252 branches, each being one trading day long. This would allow for up to 2^{252} possible final values, which is far more realistic. In fact, with modern computing, there is little difficulty in extending the tree to having infinitesimally small time periods.

The value of the call at the terminal nodes of the tree will be known, since this will simply be its intrinsic value (\$4 and \$0 in the above example). We therefore solve the tree by working backwards from the right-hand side. We can find the value of the call at each of the penultimate nodes by calculating Δ and B required to replicate the payoffs in each of the two terminal nodes that succeed it. Working backwards, we will eventually arrive at the value of the call at the first node, that is, today.

Replicating a call option in reality will require *dynamic hedging*: the required Δ and B will need to change at each branch of the tree. Why, then, do we price a call by replicating it with just stocks and bonds, rather than using stocks, bonds, and puts? Table 17.3 and Figure 17.10 show that you could replicate the call once and for all with the three other instruments, and no rebalancing of the replicating portfolio is needed. The crux is that the replicating approach works by constructing a portfolio of securities with *known* prices, so that you can value the replicating portfolio. The value of the put is an unknown. (Of course, once you have calculated the value of the call using the binomial tree, you can use put-call parity to value the put, but you cannot avoid using the tree at least once.)

TABLE 17.5

Change in value of call and put options with an increase in underlying parameters

Parameter	European Call Option	European Put Option
S_t (price of underlying asset)	+	−
K (strike price)	−	+
σ (volatility of underlying asset)	+	+
r (risk-free rate)	+	−
$T - t$ (time to maturity)	+	+*

*Typically positive for most parameter values. Exceptions include deep-in-the-money puts (which you would want to exercise immediately) and when R is large.

**WHAT DO OPTIONS PRICES DEPEND ON?
A DISCUSSION OF THE GREEKS³**

The Black-Scholes model provides a formula for the value of a European option of a non-dividend-paying security as the value of the current market price of the underlying security, the volatility of the underlying security, the risk-free rate, the strike price, and the time to maturity. We may ask how the value of an option changes as one of these underlying inputs changes.⁴ A preview of these results is given in Table 17.5.

Strike Price

Typical discussions of option sensitivities do not include a discussion on the strike price. This is because the strike price of an option is fixed once the option contract is written. Unlike the other parameters of the Black-Scholes equation, the strike price does not change as time passes. However, we can consider what different strike prices imply for the pricing of options that are otherwise the same.

³ In this section, we do not actually show the formulas for the Greek letters. Instead, we focus more on the intuition behind how the Greek letters behave. The actual formulas for the Greek letters are in the appendix to this chapter.

⁴ For readers who are familiar with calculus, we are considering partial derivatives (i.e., marginal changes).

Consider two options with the same underlying asset and the same time to maturity. Option 1 has a strike price of K_1 , and option 2 has a strike price of K_2 such that $K_1 < K_2$. Suppose that both options are calls. Then we know that option 1 is worth more than option 2 because the payoff for option 1 is greater than or equal to the payoff for option 2 in all states of nature. Specifically, denote the value of the underlying asset at maturity to be S_T , and consider what the payoffs are to the options. Suppose $S_T < K_1$. In this case, the payoff to both options is 0 as $\max(S_T - K_1, 0) = \max(S_T - K_2, 0) = 0$. Suppose $K_1 < S_T < K_2$. Then $\max(S_T - K_1, 0) = S_T - K_1 > 0$ and $\max(S_T - K_2, 0) = 0$. The payoff to option 1 is greater than the payoff to option 2 in this case. Suppose that $S_T > K_2$. Then both options have a positive payoff, but we know that $S_T - K_1 > S_T - K_2$ since $K_1 < K_2$. Thus, we have shown that option 1's payoff is always greater than or equal to option 2's payoff and strictly greater in some cases. Thus, option 1 must be more valuable than option 2.

We can similarly show that if options 1 and 2 were put options, option 2 would be more valuable.

Price of the Underlying Asset (Delta)

Delta is the change in the value of an option if the price of the underlying asset changes (with all else held constant). For example, in Figure 17.9 for a call option, delta for a given price of the underlying asset represents the slope of the line tangent to the curve at that price. The question being asked by an investor is, "How does the value of my call option change if the underlying asset goes up by a dollar?"

A call option's payoff is higher if the price of the underlying asset at maturity is higher. A put option's payoff is lower if the price of the underlying asset at maturity is higher. Thus, a call option should become more valuable and a put option less valuable if the value of the underlying asset increases. Therefore, delta should be positive for call options and negative for put options.

Next, we consider the magnitude of delta. Consider a call option with a strike price of \$50 on an underlying asset that has a volatility of 40%. The risk-free rate is 5%. The time to maturity of the option is one year. Table 17.6 shows the value of the option and its delta for various different values of the underlying asset.

Notice that a call option that is deep out-of-the-money (i.e., if the underlying asset has a value of 10) has an extremely low delta. (In Figure 17.9,

TABLE 17.6

Delta for different values of the underlying asset

Value of the Underlying Asset	Price of Call	Delta
10	<0.01	<0.01
20	0.07	0.02
30	0.92	0.17
40	3.79	0.41
50	9.01	0.63
60	16.12	0.78
70	24.46	0.88
80	33.55	0.93
90	43.05	0.96

the curve is close to flat for low S_T .) The intuition for this result is that it is extremely unlikely that the option will be in-the-money at expiration even if the price of the underlying stock increases significantly. It takes an *extremely* large increase in the price of the underlying stock for the option to be in the money at expiration. Thus, a small increase in the price of the underlying stock will have little effect on the price of the call option.

At the other end of the spectrum is a call option that is deep in-the-money (i.e., if the underlying has a value of 90). This option has a delta that is close to 1. The intuition for this result is that this option is unlikely to be out-of-the-money at expiration. Thus, its likely payoff is $S_T - K$. With K fixed, $S_T - K$ rises one-for-one with the price of the underlying stock.⁵

Another important concept is *delta hedging*. To consider this concept, let us consider a portfolio that is long one call option and short delta shares of the underlying stock. Suppose the price of the underlying stock increases by \$1. Then, we lose Δ shares $\times$ \$1 per share = Δ on our stock holding. However, we also gain 1 option $\times$ Δ per option = Δ on our option holding. Thus, by buying one call option and shorting delta shares, our position is not affected by movements in the underlying stock price!⁶

⁵ The intuition for the delta of a put option is similar, except that the \$10 underlying asset would be deep in-the-money and the \$90 underlying asset would be deep out-of-the-money.

⁶ More precisely, this is only a marginal effect, so this is true only for extremely small movements in the price of the underlying.

Thus, not only does delta tell us how much an option's price changes with the underlying (stock), but it also allows us to hedge against movements of the underlying. This is important for traders who would like to bet on the other factors that affect option prices (i.e., I may want to bet on the underlying becoming more volatile without being exposed to the risk that the underlying will drop in price).

Changes in Delta (Gamma)

It is important to note that delta hedging as described above is only exact for infinitesimally small changes in the price of the underlying stock. The idea is that if the underlying stock increases in value by \$0.01, your option will increase in value by $\$0.01 \times \Delta$. However, if the underlying stock increases in value by \$10, your option does not exactly increase in value by $\$10 \times \Delta$. Consider the above example again with a current price of the underlying (stock) at \$50. From Table 17.6, we know that the delta for our call option is 0.63. Table 17.7 considers how the value of the option changes with the price of the underlying and what the change would be if we estimated it using delta.

Notice from Table 17.7 that for small changes of the underlying stock price, the change in the value of the call as calculated by using delta is reasonably accurate. For large changes, the values calculated by using delta begin to diverge from the actual change. This is because delta is the marginal change in the call price with the underlying stock price.⁷ As Figure 17.9 illustrates, the value of a call is a nonlinear function of the value of the underlying asset. Delta is the slope of the line that is tangent to the curve at the current stock price. For tangent lines at prices close to the current price, delta is a reasonably good approximation of their slopes. However, this approximation becomes worse as we move away from the current price.

Because of the above fact, it actually becomes very important for delta hedgers to rebalance their portfolios after the underlying stock price has changed. From Table 17.7, it might seem reasonable for a delta hedger to rebalance after the underlying stock has moved by \$0.10. To do this, he would need to choose his portfolio based on the new delta of the option. Thus, it is important for a delta hedger to know how delta changes with

⁷ In lay terms, *marginal* means very small. Delta $\times$ the change in the underlying stock price is the change in the call price only for very small changes in the underlying stock price.

TABLE 17.7

Accuracy of delta

Change in Value of Underlying	Actual Change in Value of Call Option	Change in Value of Call Option as Calculated by Using Delta
-10.00	-5.22236	-6.27409
-8.00	-4.35835	-5.01928
-6.00	-3.40002	-3.76446
-4.00	-2.35109	-2.50964
-2.00	-1.21607	-1.25482
-1.00	-0.61784	-0.62741
-0.50	-0.31133	-0.3137
-0.25	-0.15626	-0.15685
-0.10	-0.06265	-0.06274
-0.01	-0.00627	-0.00627
+0.01	+0.006275	+0.006274
+0.10	+0.062835	+0.062741
+0.25	+0.157442	+0.156852
+0.50	+0.316056	+0.313705
+1.00	+0.636755	+0.627409
+2.00	+1.291742	+1.254819
+4.00	+2.653637	+2.509638
+6.00	+4.080163	+3.764457
+8.00	+5.565913	+5.019276
+10.00	+7.105669	+6.274095

the underlying stock price. *Gamma* is the rate of change of delta with respect to changes in price of the underlying stock price.

Time to Maturity (Theta)

Theta measures the change in the value of an option as it approaches expiration. As discussed earlier in this chapter, greater time to expiry gives the underlying asset greater opportunity to change. The asymmetric nature of an option's payoff means that changes in the underlying stock price in the appropriate direction (increases for calls, decreases for puts) continue to increase the value of an option, but changes in the underlying stock in the opposite direction (decreases for calls, increases for puts) do not have the same effect because the payoff cannot be less than 0.

Time decay is nonlinear in the time to expiration. Passage of one week has a greater effect on the price of an option that is one month from expiration than an option that is one year from expiration. The intuition for this result is that the former option becomes 25% closer to expiration, while the latter becomes only 2% closer to expiration.

Risk-Free Rate (Rho)

Rho is a measure of how the value of an option changes with the risk-free rate. It is positive for a call and negative for a put. A rough intuition for this result is that if the risk premium for the underlying stock does not change and the risk-free rate increases, the total expected return of the underlying stock increases.⁸ A greater expected increase in the underlying stock price would increase the price of a call option and decrease the price of a put option.

An alternative way to think about the intuition of *Rho* is to compare buying a stock and exercising a call option in the future. Compared to someone who buys the stock, an option holder does not pay the strike price until the future. When the interest rate is higher, the ability to pay later is more valuable and, hence, the call option is more valuable.

Volatility (Vega)

Vega is the expected change in the price of the option caused by a change in the volatility of the underlying asset. *Vega* is greater than 0 because of the asymmetry of options payoffs. Roughly speaking, a greater volatility increases the probability of extreme events (both positive and negative) for the underlying asset. While the lower bound payoff of a call option is 0 (so a slightly negative event and very negative event may yield the same payoff), there is no upper bound to the payoff. The intuition for a put option follows in a similar argument although the payoff of a put option is bounded at the strike price.

A VOLATILITY EXAMPLE

Below, we consider a simple example to illustrate the effect of volatility on option prices.

⁸ For readers who have some training in probability theory, the instantaneous expected return of the underlying stock under the risk-neutral measure is the risk-free rate. Thus, if this increases, the expected return of the underlying stock under the risk-neutral measure also increases.

Pricing an Option as the Present Value of Its Payoff at Maturity

In order to show the effect of volatility on options prices in a simplified setting, we consider a pricing method that can be used to price any security: the present value of the expected payoff. This technique is relatively easy to apply once the nontrivial task of determining the discount rate is done.

Expected Value

First, we have a digression on expected value. For a discrete distribution (i.e., a case in which there are a finite number of outcomes), the expected value, E , equals the sum of the value of each possible outcome times the probability that that outcome will occur.

Consider, for example, rolling a die. Suppose we play a game in which we receive a payoff equal to the number we roll. The expected value of our payoff will be:

$$E = \frac{1}{6}(\$1) + \frac{1}{6}(\$2) + \frac{1}{6}(\$3) + \frac{1}{6}(\$4) + \frac{1}{6}(\$5) + \frac{1}{6}(\$6) = \$3.5$$

We could never actually have a payoff of \$3.5 from one play of this game, but, if we played this game many times, our average payoff per play would be \$3.5.

The Example

Our objective in this subsection is to show that the value of an option is greater, the greater the variance of the underlying asset with all else held equal.

Consider a call option on Microsoft with a strike price of \$25. The possible values of Microsoft at maturity are in Table 17.8. Also assume that the time to expiration is one year and that the appropriate discount rate is 10%.

TABLE 17.8

Possible values of the underlying asset with probabilities and payoff at maturity (\$)

Price of Microsoft at Maturity	Probability of Outcome	Payoff to Call
20.0	0.1	0.0
22.5	0.2	0.0
25.0	0.4	0.0
27.5	0.2	2.5
30.0	0.1	5.0

The expected value of the call’s payoff is:

$$E(\text{payoff to call}) = 0.1(0) + 0.2(0) + 0.4(0) + 0.2(2.5) + 0.1(5) = \$1$$

The price that we would pay for the call is the present value (PV) of the expected payoff since we pay for the call today, but do not receive its payoff until a year from now. This price is:

$$PV(E) = 1/1.1 = 0.91$$

Now, let us make the underlying asset more volatile.⁹ We make the probability of the events equally likely, that is, 0.2%. Thus, we make the probabilities of the left and right tail events more likely while decreasing the probability that the stock is \$25. Let us make the same calculations as before:¹⁰

$$E(\text{payoff to call}) = 0.2(0) + 0.2(0) + 0.2(0) + 0.2(2.5) + 0.2(5) = 1.5$$
$$PV(E) = 1.5/1.1 = 1.36$$

Thus, by increasing the volatility of the underlying asset, we have increased the value of the option.

FURTHER DISCUSSION OF VOLATILITY

To use the Black-Scholes formula, we require five inputs: the option’s strike price, its time to maturity, the price of the underlying stock, the

⁹ Volatility can roughly be thought of as there being a greater likelihood of an extreme event.
¹⁰ Note that we are also assuming that the appropriate discount rate did not change. Thus, the implicit assumption is that this increase in volatility is idiosyncratic volatility and not volatility that we should be compensated for.

volatility of the underlying stock, and the risk-free rate. Four of these parameters are unambiguous and easy to find. The strike price and time to maturity of an option are defined in an option's terms. The price of the underlying stock and the risk-free rate can be readily obtained from financial news sources. However, there is no clear way to find the volatility of the underlying stock. How exactly can we define this value?

Historical Volatility

A typical way that we might calculate volatility is to use the historical volatility of the underlying stock. There are many ways to do this because it is not clear what horizon we should use to estimate a stock's historical volatility. A longer horizon will give a more precise estimate, but a shorter horizon may be more appropriate if we think that the volatility of the stock has changed over time. Traders will typically choose some historical time horizon and use a weighted average of historical volatilities to get an unbiased estimator of the volatility. However, this is highly dependent on the horizon and weighting chosen.

Implied Volatility

The above discussion suggests plugging our estimate of volatility into the Black-Scholes formula and comparing the resulting price with the actual price in the market to decide whether we think the option is cheap or expensive. An alternative method would be to take the actual market price of the option (from financial news sources) and the four easily obtainable variables to "back out" the *implied volatility*: the volatility that the market is incorporating into the current price. Specifically, given the readily available information on an option, the price of the underlying stock, and the risk-free rate, what is the volatility of the underlying stock that would make the Black-Scholes formula true?

As discussed above, the price of an option increases with an increase in the volatility of the underlying asset. Because of this fact and the fact that all the variables from the Black-Scholes formula are readily available except the volatility, traders often quote options in terms of implied volatilities. When they buy an option, they are *buying volatility*. In this sense, options can be thought of as a bet on the future volatility of the underlying stock. This is why professional options traders are often known as "vol traders."

Can we calculate implied volatility for different options with the same underlying asset? The answer is yes, but the results actually contradict one of the major assumptions of the Black-Scholes formula. The Black-Scholes formula includes the volatility of the underlying asset. This volatility should be constant regardless of the terms of any options that are written on it. However, it is an empirical fact that the implied volatilities of in-the-money and out-of-the-money options are typically higher than the implied volatilities of at-the-money options. This is known as the *volatility smile*. Typically, the implied volatility also depends on other characteristics of the option such as its maturity.

SHORTCOMINGS OF BLACK-SCHOLES

One of the failures of the Black-Scholes formula—an empirical one—is discussed above. Empirically, we cannot match all the prices of options on an underlying stock by using a single volatility for the underlying stock. A volatility that correctly prices at-the-money options will drastically underprice deep in-the-money and deep out-of-the-money options.

The Black-Scholes formula makes the restrictive assumption that the underlying asset has a lognormal distribution. This also implies that instantaneous returns to the underlying asset are normally distributed. However, it has been empirically shown that stock returns follow a distribution that has fatter tails than does a normal distribution.

The original Black-Scholes formula also could not price dividend-paying stocks, though this can be done with an assumption that dividends are paid continuously and at a steady rate. Also, the Black-Scholes formula cannot price American put options and other more complicated derivative securities. The Cox-Ross-Rubinstein binomial tree and Monte Carlo simulation can be used in these cases.

APPENDIX TO CHAPTER 17

The Black-Scholes Formula

The Black-Scholes formula assumes:

1. Frictionless, competitive, continuous markets, and no constraints on short sales.
2. A constant risk-free rate of interest.
3. No dividends or coupons paid by the underlying asset, although this assumption can be relaxed.
4. The underlying asset follows a geometric Brownian motion. This means that percentage returns are normally distributed.

Let

C = the price of a call option

S_t = the price of the underlying asset today

t = current date

T = expiration date

K = the strike price

r = the risk-free rate

σ = the volatility of the underlying asset

$$C(S_t, T - t, K, r) = S_t N(d_1) - Ke^{-r(T-t)} N(d_2)$$

Where

$$d_1 = \frac{\ln\left(\frac{S_t}{K}\right) + \left(r + \frac{\sigma^2}{2}\right)(T-t)}{\sigma\sqrt{T-t}}$$

and

$$d_2 = d_1 - \sigma\sqrt{T-t}$$

and $N(\cdot)$ is the cumulative distribution function for the standard normal distribution.

The Greek letters for a call option are:

$$\Delta = \frac{\partial C}{\partial S_t} = N(d_1)$$

$$\gamma = \frac{\partial^2 C}{\partial S_t^2} = \frac{N'(d_1)}{S_t \sigma \sqrt{T-t}}$$

$$\theta = \frac{\partial C}{\partial t} = -\frac{\sigma S_t N'(d_1)}{2\sqrt{T-t}} - rKe^{-r(T-t)}N(d_2)$$

$$\rho = X(T-t)e^{-r(T-t)}N(d_2)$$

$$V = S_t N'(d_1) \sqrt{T-t}$$

SUGGESTED READINGS

Cox, John C., and Mark Rubinstein, *Options Markets* (Upper Saddle River, N.J.: Prentice Hall, 1985). This is an academic text written by two of the three authors responsible for the binomial options pricing approach.

Derman, Emanuel, *My Life as a Quant: Reflections on Physics and Finance* (Hoboken, N.J.: Wiley, 2004). This is for readers who are interested in the autobiography of a former quant whose work is largely in options pricing. Derman is perhaps most well known for the Black-Derman-Toy model on interest-rate derivatives.

Hull, John C., *Options, Futures and Other Derivatives*, 6th ed. (Upper Saddle River, N.J.: Prentice Hall, 2005). This is an excellent textbook that is used in various master's level programs.

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Eurodollars: Cash Time Deposits and FRAs

Broker: I'm $\frac{7}{8}$ – $\frac{3}{4}$ in the one-month. Do you do anything?

Dealer: I'll support you at $\frac{7}{8}$, and I'm in there for size.

Such is the chatter that fills the phone lines over which Eurodollar time deposits are traded.

A GLOBAL MARKET

The market for Eurodollar deposits follows the sun around the globe. Because of the position of the international date line down the middle of the Pacific, the market starts, between 8 a.m. and 9 a.m. local time, in the Far East centers of Tokyo, Singapore, and Hong Kong.

Singapore owes its importance to its strategic geographic position and to the favorable access and tax treatment it accords foreign bank branches; beginning in 1976, Singapore changed its banking and tax laws with the aim of becoming the Zurich of the Far East. Singapore has maintained a favorable tax environment for many years, lowering, for example, its corporate tax rate to 20% in 2005 and enacting other pro-business measures in order to maintain its competitive tax regime. Also, Singapore has the distinction of having a futures exchange, the Singapore Exchange (SGX), formerly SIMEX (Singapore International Monetary Exchange) until December 1999 when SIMEX merged with the Stock Exchange of Singapore. It trades in decent volume a Eurodollar contract that's fungible

with the International Monetary Market (IMM) contract via the mutual offset system (MOS). SGX also trades Euroyen, with open interest at 340,000 contracts in July 2006. Trading picks up in Japan, one of the world's largest financial centers, although trading in Japan has shrunk over the years as a percentage of all trading.

Banks that are active in the Far East market, including foreign banks and in particular the big U.S. banks do some trading there that is "a natural" with business in the Far East: funding loans to finance and accepting deposits generated by economic activity in that area. However, such trading, while large, is still smaller than that done in Europe and in the United States. It is notable, for example, that Europe has actually taken a larger share of the Eurodollar market in recent years despite the large increase in the U.S. trade deficit with China, which was roughly \$204 billion in 2005. London in particular has been a center for Eurodollar trading for decades, a process that began in the late 1950s when regulations for offshore transactions were relaxed. Data from the Bank for International Settlements show, as of the first quarter of 2004, \$1.86 trillion, or 25% of all U.S. dollar liabilities of banks located outside the United States, were placed in banks in London, roughly double that of the next largest country (the Cayman Islands) and an increase from the 18% of deposits held in 1997.¹

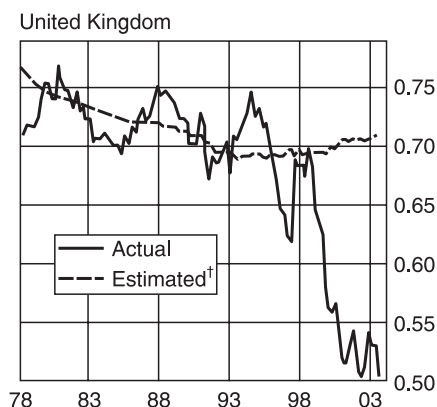
London's rise as a center for trading in Eurodollar deposits has come at the expense of Japan, whose weak banking system in the 1990s and early 2000s probably discouraged trading there. Whereas Japan once accounted for approximately 26% of all U.S. dollar liabilities of banks located outside the United States, by 2004 that figure had shrunk to about 8%.

Although London's share of the world's dollar deposits has grown in recent years, fewer dollars are being recycled there. In other words, the amount of dollars flowing back into the interbank market has been declining sharply (Figure 18.1). Data from the Bank for International Settlements (BIS) indicate that the interbank recycling rate, which measures the proportion of monies deposited in London's banks that are recycled back into the interbank market, began to fall sharply in the late 1990s, particularly beginning in 1998, probably because of the advent of the Euro currency resulting from the European Monetary Union in January

¹ The Bank for International Settlements, "A Shift in London's Eurodollar Market," *BIS Quarterly Review*, September 2004.

FIGURE 18.1

Interbank recycling ratio*



*Calculated as total U.S. dollar claims on banks normalized by total U.S. dollar liabilities vis-à-vis banks and nonbanks.

[†]Based on an estimated cointegrating vector that includes a constant and a trend term and uses data up to 1997.

Source: Bank for International Settlements

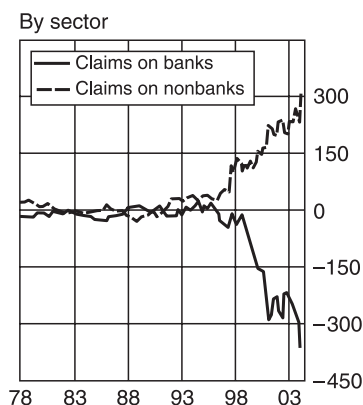
1999. In addition, more of the monies deposited in London have been directed away from the banking system toward nonbank borrowers, most of which reside in the United States (Figure 18.2). Indeed, the value of claims on nonbank borrowers was \$307 billion in the first quarter of 2004, three times as much as in 1997. About two-thirds of that money went toward U.S. borrowers. Other reasons for the decline in interbank recycling include the globalization of the banking system and the growth of the repo market, where London banks have boosted their lending to U.S. securities firms and other nonbank financial institutions. Data from the BIS indicate that by the middle of 2002, half of every dollar held in London was recycled in the interbank market, a sharp decline from the range of between 66 and 75 cents that had prevailed from the end of the 1970s to the mid-1990s.

Foreign Official Holdings of Eurodollars

Foreign official holdings of Eurodollars stood at about 20% of all dollar reserves in the middle of 2004, or \$438 billion out of the \$2.242 trillion in

FIGURE 18.2

U.S. dollar net claims of banks in the United Kingdom*



*Calculated as the stock of total assets minus total liabilities of all banks located in the United Kingdom.

Source: Bank for International Settlements

reserves identified by the BIS.² Most of the dollar reserves were held in U.S. Treasuries, with holdings standing at \$1.172 trillion in the middle of 2004. By May 2006 that tally had increased to \$1.285 trillion.

The decision by a central bank to hold dollars is an important one in terms of its impact on the financing of the U.S. current account deficit. Dollars that are invested in Treasuries directly help the United States to finance its deficit, whereas dollars held on deposit do not. Nevertheless, official holdings of dollar reserves help to support the value of the dollar, which indirectly helps to finance the U.S. current account deficit by affecting the preference for holding dollar-denominated assets.

Risks in Holding Eurodollar Deposits

The world's central banks face certain risks associated with holding dollar deposits in the United States. Although many of these risks carry low probabilities of occurrence, they nonetheless increase the preference for holding dollar deposits offshore. One of these risks is *litigation risk*,

² Robert McCauley, "Distinguishing Global Dollar Reserves from Official Holdings in the United States," *BIS Quarterly Review*, The Bank for International Settlements, September 2005.

the risk that a U.S.-based investor might initiate litigation against a sovereign in the event that the sovereign decides to restructure its debt. Such investors have in the past purchased distressed sovereign debt, refusing to participate in restructuring efforts and instead initiating litigation. There are not many countries that need worry about such speculation, but for these countries litigation risk discourages the holding of dollar deposits in the United States.

Another risk relates to international affairs. With the relationship between the United States and other countries often changing, there are times when certain countries may feel less secure in their relationship with the United States and hence less compelled to hold dollars in the United States. In recent times, for example, some Middle Eastern nations have held a relatively small amount of dollars in the United States, despite sharp increases in dollar reserves, owing to strains in their relationships with the United States. During the Cold War, the Soviet Union held scant amounts of dollar deposits in the United States, a sharp contrast to the early 2000s when Russia's dollar deposits in the United States moved sharply higher.

Liquidity is another risk faced by sovereigns, a risk demonstrated on September 11, 2001, when trading in U.S. markets was disrupted, creating liquidity risks for countries holding dollar deposits in the United States. The episode illustrated the importance that central banks should place on the diversification of their portfolio assets. Interestingly, however, central bank holdings of dollar deposits, particularly those held in U.S. Treasuries soared in the several years that followed, undoubtedly a reflection of the collective measures taken by the Federal Reserve, U.S. exchanges, and individual firms to ensure the safety and soundness of the U.S. financial system.

Incentives for Holding Eurodollar Deposits

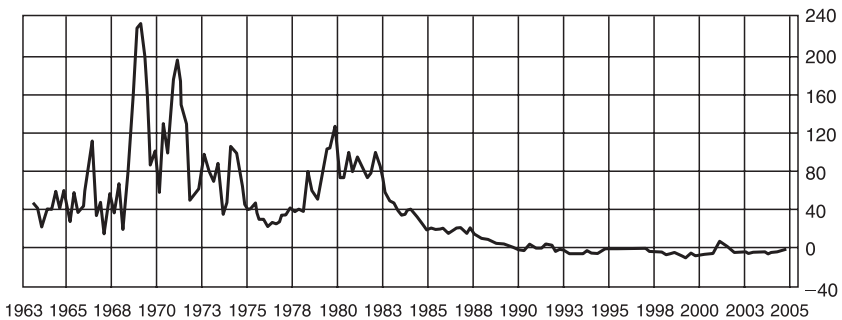
For decades, the United States has been seen as a safe haven for investment. This is one reason why foreign central banks have kept dollar deposits in the United States. Nevertheless, an even more potent influence on the decision concerning where to hold dollar deposits has been the amount of yield that could be earned on dollar deposits in the United States versus abroad. Yield, the BIS asserts, has influenced the decision more over the past few decades than concerns about country risk (McCauley, 2005). This was the case particularly in the early days of the Eurodollar market because the yield pickup on Eurodollars was fairly large, especially in

comparison to today (see Figure 18.3). The wide yield spreads created a strong incentive for central banks to shift their deposits offshore into the Eurodollar market. Capital controls put in place by the United States in 1965 that were subsequently abolished in 1974 had an important influence on the yield spread, with lending by U.S. banks to foreigners supervised by U.S. regulators. This inhibited arbitrage opportunities, which sustained the wide yield spread. Central banks hence were compelled to hold their dollar deposits offshore where yields were substantially higher.

As Figure 18.3 shows, the yield pickup that could be earned by investing dollar deposits offshore instead of in the United States remained relatively high following the abolishment of U.S. capital controls in 1974, primarily because of reserve requirements on dollar deposits, which stood at 6%. This meant that U.S. banks would be willing to pay 60 basis points more for funds borrowed abroad (usually from London) to finance lending there. McCauley (2005) asserts that, “In effect, London and other offshore centers allowed central banks to avoid paying the small amount of seigniorage earned by the U.S. public sector on reservable dollar deposits. Most of the seigniorage earnings from non-residents then (and almost all of them now), however, arose from foreign holdings of U.S. banknotes, which were almost entirely in private hands.” With the yield advantage on Eurodollar deposits lasting for such a protracted period, the Eurodollar market grew sharply. Fueling its growth further was the fact that the yield cushion

FIGURE 18.3

Spread between LIBID and U.S. certificate of deposit,
3-month rates (in basis points)



Source: Bank for International Settlements

existed at a time when world trade and international capital flows were growing sharply.

The yield advantage that could be earned on Eurodollar deposits largely evaporated in 1990 when the regulatory treatment of Eurodollar deposits was put on an equal plane with domestic dollar deposits. In particular, at the end of 1990, the Federal Reserve eliminated reserve requirements on Eurodollar liabilities. In addition, the number of banks subject to paying insurance premiums to the Federal Deposit Insurance Corporation (FDIC) has fallen in recent years, owing to capital-based requirements that permit many large banks to pay no insurance premium on their deposits. In fact, in 2005, 93% of FDIC-insured institutions, which hold 98% of insured deposits, were paying nothing for deposit insurance.³ With many banks paying nothing for deposit insurance, banks have had fewer reasons to place their deposits offshore.

When the yield advantage on offshore Eurodollar deposits was high, there was a worry in central bank circles over the magnitude of growth in the size of the Eurodollar market. The worry was that in the absence of reserve requirements, a very large pool of money would fall outside the control of monetary authorities as well as the auspices of regulators. This led the G-10 central banks to agree to reduce the amount of money that they would place offshore. These measures became unnecessary when the segmentation that had developed in the onshore and offshore money markets as a result of capital controls evaporated when the capital controls were lifted (McCauley, 2005).

Choosing between Eurodollar and U.S. Bonds

Since foreign central banks hold only about a third of their official dollar holdings in the form of bank deposits, it is important to maintain a focus on the factors that influence the decision to invest in either Eurodollar bonds or U.S. bonds. To wit, much of the decision has historically been similar to that of the market for dollar deposits. Whereas the decision on bank deposits was for a time influenced by reserve requirements, the decision on whether to invest in either Eurodollar or U.S. bonds was affected by a withholding tax imposed on the interest earned on

³ The Congressional Budget Office, "Modifying Federal Deposit Insurance," a May 2005 study sent to the Senate Banking Committee.

U.S. bonds by nonresidents. Such was eliminated in 1984, however, which helped to level the playing field and brought the cost of issuing Eurodollar and U.S. bonds closer together. Previously, Eurodollar bonds were sold at lower yields, reflecting the compensation that investors sought in U.S. bonds for the withholding tax that they were subject to.

The fact that a number of large issuers of international bonds choose to register their issues with the SEC—which boosts the cost of issuance—is evidence of the strong impact that liquidity has on the decision to invest in either Eurodollar or U.S. bonds. BIS data show that during the period 2000 through May 2005, a number of prominent international bond issuers known to draw significant buying interest from the world's central banks, issued more SEC-registered fixed-income securities than nonregistered securities (Table 18.1). For example, the Republic of Italy registered over 90% of its dollar issues during the period. These data suggest that central banks have liquidity preferences that render insignificant any yield pickup that they could earn on securities that are issued in the Eurodollar

TABLE 18.1

U.S. SEC registration of selected international bond issues denominated in U.S. dollars, 2000–May 2005 (in billions of U.S. dollars)

	SEC-Registered	Rule 144A Eligible	Neither	Total
CADES (French agency)	—	—	6.75	6.75
Hydro Quebec	0.75	—	—	0.75
KfW (German agency)	23.00	—	21.36	44.36
Quebec	4.75	—	0.02	4.77
Republic of Italy	48.00	—	4.15	52.15
Swedish Export Credit	3.10	0.25	2.99	6.34
Japan Bank for International Cooperation	1.00	—	2.25	3.25
Total	80.60	0.25	37.52	118.37

Note: Bonds issued by such nonresidents of the United States and bought by foreign central banks, even if marketed in the United States, would not be included in the Bureau of Economic Analysis (BEA) flow or stock.

Source: Dealogic, Bank for International Settlements

market as opposed to the U.S. market. Thus, the issuers of international bonds are compelled to issue SEC-registered securities in order to attract investors, despite the added cost.

A major motivation for holding U.S. securities over Eurodollar securities is the dollar's status as the world's reserve currency. When countries earn dollar reserves, they tend to invest these dollars in securities issued in the United States, most particularly U.S. Treasuries, federally related agency securities, and corporate bonds. In recent years, foreign inflows into U.S. corporate bonds have been especially high, averaging \$30 billion per month in the three years ended September 2006, a sharp increase from the \$18.0 billion per month seen in the three previous years. A factor that may have influenced the increase was the performance of the U.S. economy. It grew strongly during the more recent period, which probably boosted confidence in holding securities issued in the United States. Large amounts of liquidity injections by the Federal Reserve probably played a role, too, but that should also have boosted the holdings of Eurodollar bonds, as well.

FRAs

Back in the late 1970s and early 1980s, the big banks used to run huge Eurodollar time-deposit books on which they sought, with quite consistent success, to make money on maturity transformations, gapping, and trading for small spreads. If the yield curve was positive, a bank might position itself by lending 1-year Eurodollars and borrowing 3-month Eurodollars. Also, banks routinely did forward forwards, for example, committed to lend or borrow 3-month Eurodollars X months hence. Then, banks came under increasing pressure to shrink their balance sheets and to increase their return on equity. As a result, banks pared their Eurodollar time-deposit books, and when they wanted to position, their instrument of choice was futures, not cash.

A *forward rate agreement (FRA)* is simply an OTC variant of futures. It is a contract in which the *buyer* promises to pay the *seller* some specified rate of interest during some specified future period on some specified *notional sum*. On the *settlement date*, the start date of the notional loan or deposit, no principal changes hands; instead, the contract is settled by a *cash payment* from one party to the other; the direction and size of the payment depend on the difference that prevails on settlement day between the contract rate and the market rate for the

relevant time period. The *settlement rate* is usually determined in accordance with the definition for such established by the British Bankers Association (BBA). The rate is calculated utilizing rates quoted by eight BBA designated banks to prime banks at 11 a.m. in London on the settlement date for the particular transaction. The rates for the two highest and lowest quotes are eliminated, and the remaining four quotes are averaged and rounded upward to five decimals to yield the settlement rate.

In 1984, FRAs were introduced first in Switzerland by the Compagnie Financiere et de Credit, then in the United Kingdom by its money brokering subsidiary, the Tradition Group. By the end of 1984, an interbank market in FRAs had been started in London. Interest in FRAs then spread to continental Europe and later to the United States.

The notional amount of FRAs outstanding at the end of 2005 was \$14.483 trillion, according to the BIS, an increase of about \$8 trillion from 2000.⁴ The average daily turnover in FRAs was over \$233 billion at the end of June 2004, about three times the tally from six years earlier, although that total represented a smaller percentage of the daily turnover in all OTC interest rate derivatives, at 22.7% compared to 26.4% in 2001.⁵ Similarly, the notional amount of FRAs outstanding fell to 8.1% of all OTC interest rate derivatives compared to 10.1% in 2001.

An Example

A *buyer* of a FRA might be a *borrower* who seeks protection against a rise in interest rates; a *seller* might be a *lender* who seeks protection against a fall in interest rates. The precise mechanics of a FRA are best illustrated with an example.

Suppose that Bank X buys a 3-month FRA from Bank Y. Specifically, Banks X and Y do 2s against 5s, which means that X promises to pay Y a specified rate for 3-month Eurodollars, two months

⁴ The Bank for International Settlements, "OTC Derivatives Market Activity in the Second Half of 2005," May 2006. This publication is available only on the BIS Web site at www.bis.org/publ/otc_hy0605.pdf.

⁵ The Bank for International Settlements, "Triennial Central Bank Survey," *BIS Quarterly Review*, December 2004.

hence. Suppose that rate is 4.5, that the notional amount of the FRA is \$5 million, and that the contract period is April 1 to June 30. Bank X is getting protection against or betting on a rise in the 3-month rate to a level above 4.5; Bank Y is doing the reverse.

Suppose that on settlement day, 3-month Eurodollars are trading at 4.55, 5 bp above the contract rate. Basically, Bank Y must pay, on settlement day, to Bank X a sum equal to five 3-month bp *times* the notional principal of \$5 million. Actually, the calculation is slightly more complex; since settlement on a FRA is made in advance (at the start of the notional loan or deposit period), the settlement sum is calculated by *discounting* the interest differential due from the maturity date to the start date using the relevant market rate.

The basis used in discounting is actual/360 for dollars, actual/365 for sterling. The formula used for discounting is familiar; we derived it in Chapter 4 to calculate the price of a T-bill.

Let

r_c = the contract rate (as a decimal)

r_m = the market rate (as a decimal)

t = the tenor of the notional deposit in days

F = the face (principal) amount of the notional deposit

S = the sum due at settlement

Then, the interest differential due the buyer before discounting is (assuming r_m exceeds r_c) given by:

$$(r_m - r_c)F \left(\frac{t}{360} \right)$$

The discount factor is given by:

$$1 - \frac{r_m t}{360}$$

And S is thus calculated as follows:

$$S = \left[(r_m - r_c)F \left(\frac{t}{360} \right) \right] \left[1 - \frac{r_m t}{360} \right]$$

Plugging the numbers from our example into this formula, the precise settlement sum that Bank X is owed by Bank Y can be calculated as follows:⁶

$$\begin{aligned} S &= \left[\$5,000,000(0.0455 - 0.0450) \left(\frac{91}{360} \right) \right] \left[\frac{1 - 0.0455(91)}{360} \right] \\ &= (\$631.95)(0.9885) \\ &= \$624.68 \end{aligned}$$

The market rate used in calculating the sum due on a FRA when it settles, dubbed FRABBA (pronounced fraa-baa), is LIBOR for the relevant time period as calculated by the BBA. The BBA's LIBOR rate is the most widely used benchmark or reference rate for short-term interest rates worldwide, according to the BBA's Web site. BBA LIBOR is published on over 300,000 screens worldwide, distributed through vendors such as Bloomberg, Reuters, Thomson Financial, Telekurs, Infotec, and IDC. Reuters manages the fixing process on the BBA's behalf, collecting data from contributor panel banks, checking the data and applying quality control tests and then calculating the fixings before release of the data before noon in London.

Features of FRAs

FRAs tend to be done in the 3-month to 12-month maturity range, but they can be done for longer periods. The contract period of a FRA may be one of the standard periods for which Eurodollars are quoted, such as 3, 6, 9, and 12 months, or it can be for a *broken date*, a nonstandard period. FRAs under 3 months are difficult to find because of their thin profit margins. Trading size is usually a minimum of \$5 million. As with T-bills, FRAs are often quoted "offer-bid," a reflection of the fact that the buyer is the debtor in the transaction.

To make it easier to deal in FRAs and to ensure that FRAs were not subject to the 10% U.K. tax on gaming, the BBA laid down, in September 1985, standards for FRA contracts. These apply to all interbank dealings in London unless otherwise stated. The BBA also created a standard, fill-in-the-blanks contract for FRAs containing standard terms on the major

⁶ If, on settlement day, the contract rate exceeds the market rate, the sum due the seller is the *absolute value* of S , calculated using our formula.

aspects of FRA transactions including the notional sum, the trade and settlement dates, the fixing date, and the maturity date, for example. The BBA's terms and conditions have become the standard in the industry, and they have helped to reduce operational problems such as the timely delivery of confirmations. In fact, in the ISDA's (International Swaps and Derivatives Association) 2006 operations benchmarking survey, the ISDA notes that in the OTC derivatives market, the confirmation dispatch time for FRAs was among the lowest and that FRAs were one of the most automated products.⁷

FRAs, since they are an OTC product, can be traded in any currency in which people want to strike a deal. Dollar FRAs top the list in volume worldwide, although in London Euro currency FRAs (currencies in a variety of denominations deposited outside of the respective countries) are by far the most active. Data from the Bank of England show that Euro currency FRAs were 61% of the \$170 billion in daily turnover of all FRA transactions conducted in London in 2004 compared to just 16% for dollar FRAs. That's a big change from three years earlier when Euro currency FRAs were 41% of the \$83 billion of daily turnover and dollar FRAs were 30%. The British pound is also taking a larger share of the volume pie in London, with activity now almost equal to the daily tally in dollar FRAs, a big leap from three years earlier when the daily turnover in dollar FRAs was double that of the British currency.

Advantages of FRAs

The quick acceptance and popularity achieved by FRAs reflect the fact that they are an off-balance-sheet item. Also, FRAs offer some decided advantages over futures. First, FRAs are not locked into set expiration dates, as is the case with Eurodollar futures; instead, they can be custom-tailored to meet a specific buyer's or seller's needs with respect to both start date and tenor. Thus, a trader who uses a FRA to hedge isn't exposed to much, if any, basis risk.

Second, a trader who strikes a FRA deal doesn't have to put down any initial margin, nor does she have to worry about variation margin calls as she would if she bought or sold futures. Third, since the amount at risk in a FRA deal is only the potential settlement sum, never the principal

⁷ The International Swaps and Derivatives Association, "ISDA 2006 Operations Benchmarking Survey," 2006.

amount (which is only notional), a bank doing a FRA uses only a small bit of its credit line to its counterparty, whereas it would use a big bit if it committed to do a cash deposit. This is consistent with the fact that doing a FRA exposes a bank to minimal credit risk, since only the settlement sum is at risk and then only if rates go one way—making it a receiver at settlement.

Fourth, FRAs can be traded in currencies where there is no equivalent in the futures market as there is in the United States, Europe, and Japan. In 2004, data from the Bank of England show that 14% of the daily turnover in FRAs traded in London was in currencies other than the U.S. dollar, the euro, the Japanese yen, and the British pound. FRAs quoted by major brokers now include currencies as far ranging as the Polish zloty, the South African rand, and the Hungarian forint.

Perhaps the best feature of FRAs is that they are strictly a no-brainer. This is particularly attractive to corporate traders who can explain to managers in two minutes tops that, by doing a FRA, they are locking in a future borrowing or lending rate. If the same trader wanted to use futures, the explanation would be much longer; the trade would have more of a speculative ring (“You’re going to buy what, and do they trade next to pork bellies?”); and she’d probably have to explain margin, margin calls, and basis risk.

FRAs as a Gauge of Interest-Rate Expectations

The interest rate markets contain a great deal of information of valuable use to a variety of entities including central banks, financial firms, corporations, and investors. FRAs are no exception on this front, as they provide accurate information about market expectations on short-term interest rates. In some ways, the information from FRAs is superior to that of the Eurodollar futures market because futures have a limited number of reference dates. FRAs, on the other hand, provide information over very specific time periods and over many more dates, some of which coincide with key events such as Fed meetings, the release of major economic data, and so forth. Nevertheless, when Eurodollar futures expire on or around a key date, they are the superior indicator owing largely to their price transparency and liquidity.

The interest rates implied by FRAs should be extremely close to the rates implied by Eurodollar futures contracts, although there tend to be differences of a few basis points per month for the various expiration dates. The reason is that futures prices are affected by expectations on

interest-rate volatility, particularly for short-term interest rates, whereas FRAs are not because they are forward contracts, not OTC futures.⁸

Malz (1998) identified a number of reasons why FRA and swap rates contain information on the so-called term structure of interest rates superior to government bonds. First, there are often price anomalies in the bond market associated with the relative scarcity of particular maturities. The price anomalies arise, for example, when a particular security goes on “special” in the repo market. When it does, the price of the security tends to rise more on a relative basis than do issues of similar maturity, thus creating price disparities that are unrelated to interest-rate expectations.

Second, similar to the comparison to Eurodollar futures, FRAs provide information across a larger number of days than is possible with the coupon curve for government bonds. This is because government bonds for a particular maturity are issued only occasionally, whereas FRAs and swaps are issued daily. In addition, the relatively infrequent issuance of government bonds can create price disparities unrelated to interest-rate expectations owing to variations in demand that stem from investor preferences (for issues of certain coupon levels, maturity dates, and so forth).

Third, looking globally, government bonds with otherwise similar features with respect to coupon, yield, maturity, credit rating, and so forth are often imperfect substitutes owing to differences in taxation.

Finally, the *coupon effect* weakens the utility of yield as an indicator since it can be influenced by the size and timing of payments. For example, bonds with high coupon rates tend to trade at lower yields to maturity than do bonds with low coupon rates.

If there’s a disadvantage to using FRAs for their information content, it is that they provide a decreasing amount of information further along in the maturity spectrum. Many observers would prefer to have rate information available for both the short and long term when they are analyzing the term structure of interest rates.

The FRA Market Today

Today, the FRA market is a global one, with the market having expanded well beyond the Eurodollar market. As we show earlier, FRAs are now issued in a wide variety of currencies. Trading in FRAs is by far the most

⁸ Allan M. Malz, “Interbank Interest Rates as Term Structure Indicators,” Federal Reserve Bank of New York, Research Paper No. 9803, March 1998.

active in London, followed by New York. Trading is scant in Japan, where just \$1 billion in daily turnover took place in 2004. The problem for the Japanese is that the Bank of Japan (BOJ) for many years restricted banks in Tokyo from trading FRAs. No one knows why. The BOJ restriction has not, however, applied to Japanese bank branches outside of Japan. Some of these branches have done FRAs in London and New York, but most haven't because their head office can't do FRAs.

In interest-rate swaps, liquidity tends to be primarily in New York. However, in FRAs, liquidity is still generally in London and from the Continent; thus, New York lacks a bit in liquidity during the afternoon when London has gone home. "Then," said a broker, "we find we struggle a little. If it's a regular period such as the 6s–12s, we'll find a price OK, but in some of the odd periods, it's harder to get support than when London is in." That has changed a bit, however, with more banks acting as market makers and making a two-way dealing price in the afternoon. Also, the trading hours for Eurodollar futures has influenced liquidity. Many FRA players run hedged books, and they can hedge their FRA transactions against Eurodollar futures, which now trade around the clock thanks to electronic trading where nearly all trading now takes place. Still, when pit trading ceases at 2 p.m. (CST) in Chicago, volume nonetheless begins to slow, with some traders beginning to wrap up their trading day. This is similar to the impact that the close of pit trading has traditionally had on trading in the Treasury market.

Banks are the primary users of FRAs, and they use them in various ways. Some banks do 70% of their FRA business against a futures hedge. They will work out (compound) the rate on a futures strip and compare it with the rate at which they can do a FRA. Sometimes, they can pick up, say, a 6s–12s FRA 6 or 7 bp below the corresponding futures strip. If this is the case, they buy the FRA and buy the futures strip as a hedge. Then they look for an opportunity during the life of that transaction to lend the FRA back at the rate on the futures strip. At that point, they close their futures position by selling futures, and in theory they've locked in 7 bp minus transaction costs. That's a small spread, but the players make money by doing volume. A lot of banks play this game.

Also, a number of banks use FRAs on a purely speculative basis, to gap. The banks like FRAs because they're off balance sheet and reasonably liquid.

A bank may also use FRAs to generate cheap funds, whereas in the past, they might have used a forward forward. For example, a bank might

find that, by taking 1-year dollars and then lending a 6s–12s FRA, it can provide itself with much cheaper 6s than it could pick up in the market. One problem with this is that, because the bank is taking 1-year money, it ties up a line for a year to create what's really only a 6-month position. Despite having done a 6s–12s FRA, the bank, when the second 6-month period rolls around, must still lend, since its 6s–12s FRA placed no funds, just locked in a rate. Because the FRA settles in 6 months at LIBOR, if the bank can lend at LIBOR, it will be breaking even on the back half of the deal, but if it can only lend at LIMEAN (the average of LIBOR and LIBID rates, as fixed by the BBA), it will lose 6 bp for 6 months. Sometimes, deals of this sort can produce 6-month dollars at an eighth below where a bank could pick up 6-month dollars. But the trade is a sometimes affair; it will work for several months and then go away.

At times, a bank can work the other way around. Say a bank is looking for 6-month dollars and can't find a cheap source; a customer comes in and offers the bank some cheap 3-month dollars. If it takes them, then maybe by borrowing a 3s–6s FRA, the bank can produce some cheap 6-month dollars as well.

A lot of banks are also doing FRAs against their corporate customers. Corporate America and corporate Europe do a lot of FRAs with their banks, sometimes huge ones. For a corporate with seasonal fluctuations in cash flows—it anticipates that it will be borrowing or lending Eurodollars during certain periods—a FRA is a perfect instrument. A corporate can lock in a rate for a period that matches her dates and not have to worry about margin as she would with futures. A corporate can't come directly into the brokers' market; she does her deal with her bank, which in turn lays it off in the brokers' market.

THE BROKERS

The major banks in London post rates at which they are willing to take Eurodollar deposits in different maturities, and they do pick up some money directly, particularly from banks on the Continent. Much interbank trading in Eurodollars—cash and FRAs—is, however, done through brokers. Brokers are a necessity in the Euromarket because participants in this market are so numerous and because they are scattered around the globe.

In the late 1970s, the Eurobrokers were limited to brokering cash Eurodollars. Then, as interbank trading of Eurodollar time deposits fell off somewhat, the brokers picked up brokering first interest-rate swaps and

then FRAs. Over time, the brokers' off-balance sheet business (or capital-markets business, as they call it) probably grew to a greater extent than the drop-off in their cash business; so net, their volume and income are up. Today, interest-rate swaps represent the bulk of off-balance sheet business, at 77.4% of the notional amount of OTC derivatives outstanding at the end of June 2004, according to the BIS.

Today, there are many brokers in the Eurodollar and FRA markets. A few of the largest include Euro Brokers, Tullet Liberty, and ICAP. The brokers all operate worldwide and have operations in all the principal Eurocenters. Many of the brokers have been formed by trans-Atlantic and trans-Pacific mergers and amalgamations; and their ownership is strongly British. However, Euro Brokers, after being bought with British money, was bought back with Canadian money. Maxcor Financial, now a wholly owned subsidiary of BGC Partners, which is a major provider of brokerage services worldwide, acquired Euro Brokers in 1996.

Today, a broker of Eurodollars, FRAs, and swaps may also broker foreign exchange or fed funds and repo. Also, some of the brokers are FCMs (futures commission merchants), which makes sense, since being an FCM enables a broker to provide her customers with, if they want it, one-stop shopping for FRAs and a futures hedge.⁹ Thus the biggest of the brokers have huge staffs; ICAP, for example, employs more than 2,900 people worldwide with offices in the three major financial centers—London, New York, and Tokyo. It also has operations in countries as wide ranging as Mexico, South Africa, Bahrain, and China.

FRA brokers enable their customers to trade FRAs electronically, matching buyers and sellers on user-friendly screens that make the matches easily. Users enter their position sizes into open boxes for the desired maturity date for the desired FRA, whether it is for a 1×3 (one month by three months), 3×6 (three months by six months), and so on, and some screens enable pasting from Excel spreadsheets. Users can also allocate credit to other participants by entering credit limits onto the screen.

Brokerage Rates

Brokerage rates on Eurodollars used to be identical in London and New York. Originally, the London rates were set by the Bank of England, and New York

⁹ The big U.S. banks have all opened a holding company subsidiary that's an FCM, but a lot of other banks need to go to an FCM to execute a futures trade.

basically just went by London rates. Then some of the banks in New York—it started in foreign exchange—negotiated volume discounts. Some time later, the Bank of England told the U.K. brokers, “You can charge what you like.” Currently, the basic rates for everyone in both places are less than an 02 for cash (both sides pay) and about 60 cents to 80 cents per million for FRAs and interest-rate swaps. The bigger players have all negotiated discounts, with often the same package in both New York and London. The discount may kick in when they get to certain levels in commissions, and the discounts may increase as the commissions increase. This is fairly standard practice in the brokerage business including, for example, in dealing in equities.

The Brokers’ Market

Each brokering firm is selling to its client banks a vast, fast-operating information network, which banks could not easily duplicate. In this respect, it’s interesting to note that the British, perceiving the importance of good communications to London as a financial center, long ago created excellent and relatively cheap phone and Telex facilities to link London with the rest of the world—that at a time when domestic communications were quite another matter.

In Eurodollar time deposits, as opposed to FRAs, there’s a lot of activity in a wider range of currencies—sterling, dollars, euros, and yen. While some major banks have a big deposit base and are not the active takers of funds in the brokers’ market that they once were, there is still a lot of activity in this market. Some of the big globals are always buying or selling. Also, in the interbank market, there are always small banks that don’t have a big deposit base and that are takers because they need money to fund their loan books: the small Spanish banks, the Italian banks, U.S. regionals, and the small English banks.

On the taking side, however, it’s the Asians who dominate. The Chinese and Japanese are such active takers of dollars, often to do one arbitrage or another, that one gets the impression that they have yet to hear three words that the other banks have heard loud and clear: *capital adequacy requirements*. Constantly, these entities are in the market doing, in huge size, arbitrages (involving time deposits, Eurodollar CDs, futures, swaps, whatever), typically at far smaller spreads than the big Americans, given their balance-sheet concerns, require.

In the Eurodollar market, there are hundreds of substantial players. In the Euroyen market, in contrast, a small number of Japanese

banks dominate: they're so big that no one wants to go in and tangle with them in their own currency. The Japanese are unique in that they dominate their own Eurocurrency market by a big margin. Before the advent of the euro in 1999, for example, the Euromark market was not dominated by the German banks. Also, the Swiss banks do not dominate the market in Euro Swiss francs, although other banks dealing in Euro Swissy do keep a close eye on what the big Swiss banks are doing.

Pace and Professionalism

Brokering Eurodollars, like fed funds, is a rapid-fire, bang-bang game. It requires total concentration on the part of the broker and an ability to simultaneously listen to the phone with the right ear and keep track with the left of any changes in quotes other brokers in the room shout out, all while keeping her eyes glued to her screens. Brokering requires thinking but only of the quickest sort. "The thing that comes closest to it in the United Kingdom," said the director of a big brokering outfit, "is a British turf accountant [bookie] calling rates across the wire."

In London and in other centers as well, most of the Eurodollar brokers and bank dealers turn out to be British and more specifically to be cockneys. For some reason the east end of London, a working-class area, seems, like similar areas in many big cities, to breed the sort of person that brokering and dealing require—one who is quick-witted and has a sense of humor that keeps her from going barmy at the end of a day of pressure. These are the same folk found in the trading pits of the futures exchanges in Chicago.

Brokering of Eurodollars, cash, and FRAs, is an extremely professional operation. One advantage to a bank of using a broker is anonymity. A big bank can bid for large sums in this market without moving price, something it might not be able to do if it went direct.

To preserve anonymity, it's a cardinal rule among brokers that they never give up the name of a bank bidding for or offering funds until one bank actually initiates a transaction. At that point, the broker tells the lender the borrower's name so that the lender can check whether her line to the borrower is full. If it isn't, the ethics of the game are that the lender must sell the funds she has offered to the bidding bank; in particular, she is not to go around the broker and sell directly to the bidding bank.

In FRAs, as in cash, the size banks want to do can, at times, be huge. As one broker noted, "A bank might want to do several billion or more of FRAs in a certain period—perhaps against his cash book or against

a corporate, perhaps as a hedge or a speculation. There has been some huge size done by corporates—oil companies, multinationals, and the like.”

In New York, a large portion of the FRA business done by banks is done on a direct basis. Generally, banks will quote each other a market having a spread of just a few basis points, although a 2 bp spread is most common. That’s the basic width of quotes in the FRA market.

As noted earlier, market liquidity is good in FRAs, with daily turnover approaching several hundred billion dollars. One broker noted: “If someone asked us to quote a price in a period in which we have nothing, we’d feel confident about quoting a normal spread and being able to support it. In the more popular periods, such as the 3s–6s, 6s–12s, we’d like to think we could quote a low spread and be able to support it.”

Because brokers such as Euro Brokers have a reputation (one not shared by some continental brokers of foreign exchange) for not “blowing around” information on who’s bidding and offering in their market, some large banks are willing to be quite open with their broker about what they want to do. A bank dealer, for example, might say to a broker, “In the 6s, I want to do a lumpy piece. What’s that market really like? If I took a large amount, would it move against me?” Since a broker monitors the market minute by minute, that’s a question to which she can give an informed reply. Thus, in the eyes of many bankers and brokers, an open relationship should exist between a good bank and a good broker. However, many are of another opinion; they never tell their broker what they *really* want to do.

Working a Trade

A big part of the broker’s job is to provide the banks with an information network, a vital service, since no large bank would start dealing in the morning without first calling the brokers to get a feel for levels and tone in the market. A good broker does more, however, than just quote prices. She works to narrow spreads and create trades by persistence, cajolery, pleading, humor—any ploy that works.

If, for example, the 1-month were quoted at $4\frac{7}{8}-\frac{3}{4}$, the broker might call a bank and say, “Can you close that price for me?” If the bank dealer answered, “I’ll pay 13,” the market would be at $4\frac{7}{8}-1\frac{1}{16}$, and the broker would start calling around to find a bank that would offer below $\frac{7}{8}$. Suppose she found an offer at $\frac{7}{16}$. Now, the bid and the offer would be only $\frac{1}{16}$ apart. At that point, the broker and her colleagues, each of whom might have direct phone lines to a dozen banks, would start “banging around the board”

(punching those direct phone line buttons) saying, “Anything in the 1s? Nice close price.” Eventually, some bank would probably bite, and a trade would have been created and done.

“Our job,” observed another broker, “is not just quoting rates; it may require bringing about a deal between guys who want to do slightly different things. Say 3s are $\frac{5}{16}$ – $\frac{1}{4}$ and 4s are $\frac{3}{8}$ –5 [a $\frac{1}{16}$ spread in each tenor]. If someone asked me to quote 3½ months, I’d say $\frac{11}{32}$ – $\frac{9}{32}$; and if they take me, I go to the guy who is giving 3s at 5 and say, ‘How about lending longer at 11?’ or to the guy lending 4s and say, ‘How about lending shorter at 11?’

“It’s easier than it sounds; there’s lots of liquidity, lots of players, so you don’t really get caught. Most of the dealers know where it is anyway, so they are just saying, ‘Go get it.’”

The Mechanics of Brokering

The big brokers speak to a wide range of banks, including most of the bigger banks and most of the medium-tier banks. “We have,” noted one New Yorker, “direct lines and facilities to talk to most banks. There are a few banks a broker doesn’t talk to because of real or perceived past problems; that’s always going to happen. We speak to every Japanese bank in New York, to all of the Americans, to all of the clearers, to most European banks, and to a cross section of regionals. Some of the brokers have a better handle on the regionals, especially those who have a big fed funds desk. A regional bank always has its fed funds to do, and if occasionally it wants to do something in 3-month Eurodollars, it will go to one of those brokers.”

When a bank puts a bid or an offer into a broker, it’s understood in London, where the primary participants in the market are international banks with traders who do at most deposits and foreign exchange, that the quote is good until a trade is made or the bank calls back to say, “I’m off.” In the United States, a trader at a regional bank may be responsible for not only Eurodollars and foreign exchange but also a number of domestic instruments as well; for that reason, a broker, depending on the customer, may feel the need to call her back if some time has passed to reconfirm her bid or offer.

The broker, for her part, can be held to any price she quotes as firm provided that a line problem does not tie up a trade. If, for example, Citi London offered to sell 6-month money at the bid rate quoted by a broker and the bidding bank then told the broker she was off and had forgotten to call, the broker would be committed to *substantiate* her bid by finding Citi

a buyer at that price or by selling Citi's money at a lower rate and paying a *difference* equal to the dollar amount Citi would lose by selling at that rate. Because activity in the Euromarket is hectic, mistakes do occur, and they can be expensive: on \$50 million for 6 months, even $\frac{1}{16}$ of 1% works out to \$15,625.00. Since brokers operate on thin margins, a broker wouldn't be around long if she got "stuffed" often; so good brokers take care to avoid errors.

Years ago, whenever some important news hit the market—big economic news or whatever—the banks would call the brokers to shout "Off, Off!" on their bids and offers, and a broker would quote rates on an "I suggest," "I think," or "I call" basis, which meant that a bank could not hold her to these quotes. A sharp break in market activity put a broker back in the position in which she started the day, with a blank pad. To get trading started again, she had to call around to the banks to find out where they anticipated money would now trade and then try to find banks that would substantiate these new levels by making even small, but firm, bids and offers. Today, with the large presence of U.S. banks this is less true. Participants tend to keep trading pretty much regardless of what news hits the market.

Quotes and Maturities

In the market for overnight fed funds, money normally trades for immediate delivery. In the Euromarket, in contrast, the delivery date, or *value date* as it's called, is two days hence unless otherwise specified. The reason is that foreign exchange settles two days forward. If a Eurodollar spot transaction is dealt on, say, a Tuesday, it results in funds being delivered on Thursday. The Euromarket, however, also deals in overnight funds for immediate delivery and for delivery the next day. The former sort of transaction is referred to as a deal in *overnight* funds or as *dealing over today*; the latter is referred to as a *tom next* (for tomorrow next) transaction in London and as a *rollover* or as *dealing over tomorrow* in the United States.

Eurodollar deposits are quoted actively in the interbank market in a wide range of maturities: overnight, tom next, spot, the week, 1 to 6 months, 12 months, and 1 to 5 years. The Euromarket is a short-term market; depending on rate expectations, a much larger portion of trading volume occurs in the 3-months-and-under range. Most of the rest occurs in the 3-months-to-1-year range. Trades of 2- to 5-year money occur but are much less common.

While the Euromarket actively trades 1-, 2-, 3-, 6-, and 12-month deposits, it is, like the repo market, a flexible-date market in which participants may do any number of days they need. Odd-day, off-the-run deposits (e.g., for 26 days) are referred to as *broken* or *cock dates*. Brokers quote them by saying, for example, “We want early 2s out to the 15th [a deposit for less than 2 months that ends on the 15th]” or “We have 1 week short of 2s to go.” Depending on the time a call is put into a broker, dealing over today may be a hassle, but dealing over tomorrow is not.

Euro Feds

It’s possible to carry out Eurodollar transactions over Fedwire when both sides have a Fed account. Whether a bank chooses such transactions, dubbed *Euro Feds*, depends heavily upon where the transactions take place. Eurodollar transactions that take place in London settle mostly through CHIPS (clearinghouse interbank payments system); transactions that take place in New York settle mostly through Fedwire.¹⁰ This is a change from the past when Euro Feds were more of an exception than the rule. The main reason relates to the elimination of reserve requirements on Eurodollars, which we discuss earlier in the chapter. There is also the convenience factor. A foreign bank branch in Los Angeles that’s doing a trade with a regional American in Philadelphia or a Japanese bank in Seattle might rather pay and receive funds via its local district Federal Reserve Bank than via a New York bank. In early 2006, roughly 95% of all U.S. dollar cross-border payments were settled through CHIPS, which was clearing \$1.4 trillion in payments on a daily basis (see below and Chapter 12 for a further discussion on CHIPS).

In the early 1980s, clearinghouse funds differed from fed funds in that they turned into immediately available funds, that is, fed funds, only on the day after the delivery or value date. The distinction that existed in the Eurodollar market between the value date and the date on which good funds were available to the recipient created the basis for some actively pursued technical arbitrages between fed funds and short-dated Eurodollars. All that ended when CHIPS moved to same-day settlement

¹⁰ Leonard Bartolini, Spence Hilton, and Alessandro Prati, “Money Market Integration,” Federal Reserve Bank of New York, Staff Report no. 277, October 2005.

in 1981. CHIPS shifted to intraday settlement in 2001, in a process more commonly known as *payment finality*.

Size and Quotes

On occasion in the Euromarket, one encounters a situation in which the bid and asked rates are identical—what a broker would call an *either-way or locked market*. Since brokerage is paid by both the buyer and the seller in the market, an either-way market can occur only when the market in a given tenor gets “hung up on lines.” Suppose Dresdner were offering \$100 million of 1-month money through a broker and that TD Bank decided to take this money. The broker would call Dresdner and say, “OK, we will pay at your price.” Dresdner would then ask, “Who is it?” and the broker would say, “TD Bank.” At that point, Dresdner might say, “Done for 100” or “I’m full on that name” or “All I can do for him is 10.” In either of the last two cases, Dresdner would still have dollars to sell, TD Bank would still have dollars to buy, and the two might end up quoting identical bid and offer rates.

In quoting Eurodollar rates, London quotes the rates “tops and bottoms”; that is, the offered rate and then the bid rate. New York does the reverse for reasons now shrouded in history.

Speaking of the bid-offer spread in Eurodollars, a broker observed: “In the cash market, it’s common to have difficult lenders lending in the middle and some of the smaller names paying up; so if the quote’s, say, $\frac{3}{4}$ – $\frac{7}{8}$, it’s pretty general that you have an either-way [*13-across* or *13-choice*] market, but the credit would not be as good as $\frac{3}{4}$ – $\frac{7}{8}$. Basically, it comes down to whom you are talking to: if you are talking to someone who wants her prices based on real tip-top credits, you might make her a market $\frac{1}{16}$ or $\frac{1}{8}$ wide.”

The minimum size in which brokers of Eurodollars will deal is \$1 million, the same as the value for the Eurodollar futures contracts that trade in Chicago, but most trades are much larger. In the market for overnight and short-dated funds, trades of several hundred million dollars are common. In the fixed dates, trades are somewhat smaller in size.

Normally, activity in the Euromarket is heaviest in the 6-month-and-under maturities, since most of the assets Eurobankers are funding are either short in tenor or roll every 3 to 6 months. When borrowers anticipate that rates might rise and the yield curve is not too steep, activity will be centered in the 6-month area because borrowers will opt for a 6-month roll.

Alternatively, if rates are expected to drop or remain stable, activity will be strong in the 3-month area. Trades of long-dated funds, up to 5 years, occur in the interbank market, but normally they are done direct because brokerage is high on a big trade of long-dated funds.

Naturally, brokers prefer trades in the long dates to those in the short dates. But they try to give all their customers, including heavy traders of overnight funds, good service on the theory that if they support a bank in the short dates, they will occasionally get in on the gravy train when the bank trades long-dated funds in the brokers' market.

TIERING

Eurodollar deposits are a heterogeneous commodity. They differ with respect to not only maturity, but credit risk—the name of the buying bank and the center it's in. It is often said about Eurodollar deposit rates that they are sometimes higher than domestic deposit rates owing to risks in placing dollars outside of the United States, such that there is tiering, or differentiation, of quotes according to banks' names and to the centers in which they operate.

“With respect to tiering, a lot depends,” observed one broker, “on who is tiering the banks. A Japanese bank will tier all the Japanese banks at the top and then the rest of the world. An American or European bank would probably start with the top Americans—whereas you once had the top 10 Americans, there is now tiering within that 10—and the top Europeans. Their first tier would be the really prime Americans, the British clearers, perhaps the big German and the big Dutch banks; their second tier would be the French, the bigger Australian banks; and their third tier would be second-tier Americans along with medium to smaller European names and some Japanese names.

“However, tiering is extremely varied. Some banks still have no credit lines to any Japanese banks: a few regionals will put offers into the market, but say, ‘I can’t do any Japanese names.’ Regional Americans tend to be more conservative; they are looking either for a prime American or a top European—that’s all they can lend to because they have very restrictive credit lines.

“Today, the rate differentials due to tiering are subtle. Say, for example, 3-month Eurodollars are $\frac{3}{4}$ – $\frac{7}{8}$ %. At the $\frac{3}{8}$ %, the large U.S. commercial banks and the clearers would be paying. If for some reason they were willing to pay more, they’d issue commercial paper. In the middle, there

are the Japanese and the medium-type European names paying $\frac{13}{8}\%$. At the top of the market, there are the small names (for example, Korean banks and some small London and European names), subsidiaries, and such paying $\frac{7}{8}\%$.

“Nevertheless, some will step up to pay $\frac{7}{8}\%$ because they are not getting any funds at 13—if there are lenders at 13, they are full with players with the same standing in the market. Occasionally, some of the larger players will pay the top because the supply of funds at lower levels is too sparse. The tiers do not always work in terms of quality of name; sometimes, they work in terms of credit availabilities.

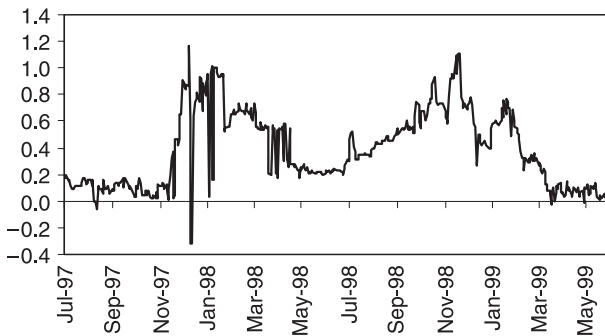
“Today, there is less tiering than years ago when, for example, some of the regionals’ credit lines were so strict that they could lend only to other Americans. This was especially true during the early 1990s when many savings and loan institutions failed. Some of the big Americans used to bid $\frac{1}{8}\%$ below the market and still receive money from regionals.”

Tiering across Borders

Lenders have proven themselves to be conscious of sovereign risk. A clear illustration of this is the risk that investors assigned to Japanese banks during the late 1990s, particularly during the Asian financial crisis in 1997 and 1998 (Figure 18.4). During this period, the yield spread between the rate paid on dollars deposited in Japanese banks compared to that of dollars deposited in

FIGURE 18.4

Yield spread between 3-month dollar deposit rates in Japan versus offshore dollar deposit rates (in percentage points)



Source: Bloomberg

European banks widened sharply. Although Japan's banking system continued to be perceived as weak in the years that followed the crisis, yield spreads narrowed, averaging about 6 basis points above the rates that could be earned on dollars deposited in European banks from 1999 through the middle of 2006. This suggests that despite the attention paid to sovereign risk, investors have a strong tendency to normalize dollar deposit rates across borders.

Tiering in FRAs

In FRAs, there's little tiering because credit concerns are much less. "Also," one broker adds, "in the *cash market*, price might be $\frac{3}{4}$ – $\frac{7}{8}$, and you might have 25 bids and 25 offers at various levels. That gives a bank leeway to be a little choosy. If a big American and smaller names are paying the same price, the lender will do the American; and the smaller names will have to pay up, which causes tiering. In FRAs, we are looking at so many periods and at so many different combinations of dates that you've probably got only one bid or one offer in any given period; consequently, a bank can't be too choosy about who they'll lend to because only one bank may be paying in their period. Also, the credit risk is too small to justify real tiering."

While brokers never divulge the names of the banks that have placed bids and offers with them, to cope with the problems posed by lines, names, and locations, they sprinkle their runs with bits of information that can be helpful to the bank to which they are quoting a run. For example, a broker might note that the bid in a given tenor was by a "prime name out of Hong Kong" or that the offer in some other tenor was from a "rather difficult lender," that is, one with lines to only a few banks.

To be as informative as possible, the brokers also throw in with their regular quotes some hints as to what is being done or could be done in the market. For example, a broker might note, "The 3s are $\frac{3}{16}$ – $\frac{5}{16}$ but may come at $\frac{1}{4}$," or, "Overnight funds are bid $\frac{7}{16}$ out of London and Singapore and come OK at $\frac{1}{2}$." The variations are endless. A good broker does more than just quote rates: she gives her client banks, at a rapid-fire pace, all the useful information she can.

SETTLING THROUGH CHIPS

In Chapter 7, we mention the fact that most Eurodollar transactions clear not over the Fedwire but through the New York Clearing House. The New

York Clearing House, the oldest and most prominent clearinghouse in the country, was set up to provide a mechanism for clearing both customer checks and bank official checks. Since the institution of the Fedwire, the bulk of the domestic funds New York banks exchange among themselves now go over that wire, but the Clearing House has assumed a vastly more important function, *clearing Eurodollar payments* among domestic and foreign banks.

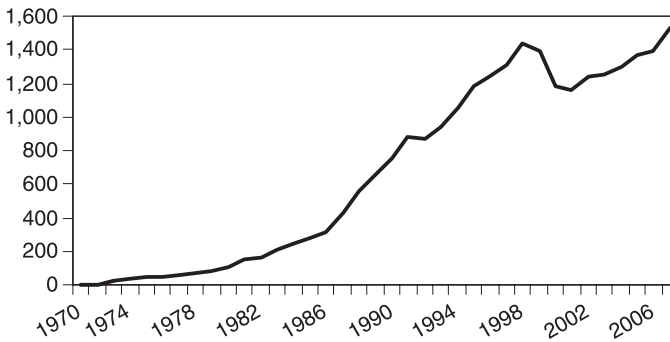
Almost every Eurodollar transaction creates the need for an interbank payment. In the old days, New York banks made such payments by issuing official checks, which were cleared through the New York Clearing House. A big New York bank might both issue and receive 1,500 or more official checks a day. Thus, clearing involved a huge amount of tedious, expensive, and labor-intensive paperwork. Despite the enormity of the job to be done, checks received by the Clearing House were normally *cleared* on the same day so that *settlement* in fed funds could be made between the banks on a timely basis the next day. Sometimes, however, checks got lost, and clearing them took three, even four, days.

To reduce the unnecessary float such delays caused, the Fed strongly urged the New York Clearing House banks to set up a computerized communications network to handle interbank money transfers. This system, *CHIPS*, an acronym for *clearinghouse interbank payments system*, went online with live transactions in April 1970. CHIPS is governed by a 10-member board consisting of senior officers of large banks that establishes rules and fees and admits and reevaluates participants.

Participants in the CHIPS system now include 46 banking institutions, many of which are foreign; the ranks of these include foreign bank branches and agencies as well as Edge Act corporations set up by domestic banks to carry out their international banking business. The current tally is much lower than the peak of 142 participants that existed in 1985, mainly because of consolidations in the banking sector. In 1998 CHIPS eliminated a requirement that its members have an office in New York City, likely preventing an even larger decline. The decline in the number of participants has had no bearing on the amount of payments processed by CHIPS, with the daily average at \$1.533 trillion in the middle of 2006, far more than the \$313 billion that was processed in 1985 (Figure 18.5). Moreover, the number of transactions processed daily has also increased sharply, moving from 99,402 in 1985 to 302,652 in 2006 (Figure 18.6).

FIGURE 18.5

CHIPS daily average of payments processed (in billions of dollars)



Source: Clearinghouse Interbank Payments System

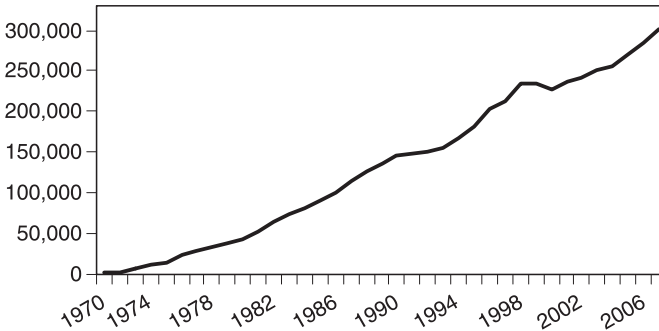
Why CHIPS Is Often Preferred over Fedwire

Since CHIPS moved to same-day settlement, fed funds and what used to be called clearinghouse funds have become fungible in the sense that a payment made through either system results in the receipt of good funds on the day the payment is made. Moreover, in 2001 CHIPS implemented payment finality, enabling it to compete with Fedwire because it made funds available immediately, as had been the case with Fedwire for years. To the outsider, this raises the question of why CHIPS is often chosen over Fedwire. There are several compelling reasons why it has evolved to this point.

All payment mechanisms are bound by the payer's technical capability to execute payments which in turn depends on how execution has traditionally been done. Originally, money market participants in New York made payments to each other by check. Messengers delivered these checks to the New York Clearing House, where they were cleared and settled on the next day. Then, the Clearing House switched to a computerized system, which automated the settlement procedure, but by tradition, these checks were next-day money. So there was in place a next-day settlement system with which everyone was happy. Also, and more importantly, there was an infrastructure in place for using this system; participants had both

FIGURE 18.6

CHIPS daily average of payments processed (in numbers of transactions)



Source: Clearinghouse Interbank Payments System

a computer linkup to CHIPS and people trained to use it; the system worked; and everyone used it.

Then, participants in CHIPS gradually became uncomfortable with the huge overnight or worse still over-the-weekend risk to which next-day settlement exposed them. CHIPS solved this by first moving to same-day settlement and then to payment finality—immediate availability. Now, the value date of the funds paid over both CHIPS and Fedwire are the same. In this respect, they are fungible, and in theory, participants could use either network to transfer funds.

In practice, foreign banks make and receive the bulk of their payment through CHIPS because their pattern of making and receiving payments tends to create huge daylight overdrafts in the accounts that they keep with settling banks. The Fed will not permit foreign banks to run big daylight overdrafts with it. It reasons: Why should we take the risk? The big New York banks are willing to take this risk for foreign banks that are their customers because they feel that they are compensated for assuming it through customer relationships.

Domestic banks are also heavy users of CHIPS, preferring to make their smaller payments over the system because of its lower cost. One of the reasons that foreign banks use CHIPS is that they have greater latitude with respect to running daylight overdrafts on CHIPS than they do on Fedwire.

The SWIFT Messaging and Interface System

It used to be common for banks to use a variety of methods to transmit payment advice and instructions for international transactions that were eventually cleared through CHIPS. In 1973, the leading international banks began planning a *private* bank communications network called SWIFT, an acronym for Society for Worldwide Interbank Financial Telecommunications. SWIFT, a computerized message system, was designed to standardize the transmission of bank messages. In the Federal Reserve's 2004 *Commercial Bank Examination Manual*, the Fed described messages systems such as SWIFT as "indispensable components of funds-transfer activities."¹¹

Unlike payment systems, which transmit actual monies, message systems process administrative messages and instructions to move funds. Although instructions to move funds do not immediately result in transfers of funds, they do result in the issuing bank's having an immediate liability, payable to the disbursing bank. From the Fed's perspective, this is why it is important that the internal operating controls be as stringent as the ones implemented for Fedwire and CHIPS.

SWIFT is owned by the 2,314 members located around the globe that currently subscribe to the system. SWIFT first went live on a limited basis in Europe in 1977. It was then extended to North America, after that to the Far East, and finally, in 1984, to the Middle East. SWIFT opened an office in Berlin in 1995 and another in Sydney in 1997. It also maintains offices in the major financial centers in New York, London, Hong Kong, Beijing, Singapore, and Tokyo. By the middle of 2006, SWIFT was processing 11.257 million messages per day, 16% more than a year earlier. The SWIFT system was being used by its 2,314 members, 3,088 submembers, and 2,568 nonmember participants, for a total of 7,970 users.

The major advantage of SWIFT is that it has a strict format requirement for messages. This enables subscribing banks to construct a computerized interface that keys messages transmitted via SWIFT directly into the CHIPS system or into Fedwire, as appropriate. Doing so eliminates clerical processing of Telex messages and thus streamlines, for subscribing banks, the making and receiving of payments through CHIPS and through Fedwire.

¹¹ Federal Reserve, *Commercial Bank Examination Manual*, Section 4125.1, November 2004, p. 3.

Using its existing network, SWIFT has also been able to offer other services to its subscribers. For example, it has extended its service to the low-value payments and automated clearinghouse (ACH) market. SWIFT's trade services utility (TSU) is a new product that allows banks to track transactions from the time orders take place until payments are made. In recent years, hedge funds have found value in using SWIFT, which offers a wide range of services related to trade services, clearing and settlement, and custody. SWIFT's SWIFTNet Affirmations product is used by firms as a real-time matching and exception handling system for foreign exchange, money market, and derivatives confirmations.

CROSS-CURRENCY SWAPS—THE MECHANICS

A substantial part of the total Eurocurrency market represents deposits of nondollar currencies. Eurodeposits denominated in currencies other than the dollar are actively traded in the interbank market in the same way that dollars are. The only significant difference is that trading volume is much lower in them than it is in dollars.

Some trading in Eurocurrency deposits is generated by *swaps*, which are extensively used by banks to match assets and liabilities in their Eurobooks by currency and to create deposits in a desired currency as cheaply as possible. A favorable development for the swaps market has been the increased volume of hedging, which has improved the forward markets, as well as the narrowing of bid-ask spreads in the foreign exchange market. However, the flip side of these developments is that adjustments occur more rapidly. If a rate gets out of line, creating a possibility for profitable arbitrage, someone will hit it quickly and put it back in line. Thus, the opportunities available to a bank to cut funding costs by using swaps to create currency deposits are more evanescent than they once were, and where they are varies tremendously.

In Chapter 7, we describe how a swap (*switch* to the British) operates in intuitive items, but we do not derive a formula for calculating the all-in interest cost of funds generated through a swap. The easiest way to do so is with an example.

Swap: Dollars into Yen

Suppose a bank commits itself to lend 6-month Euroyen and now must fund this loan. It could take in the funds *natural*, that is, take a 6-month

yen deposit, or it could take 6-month dollars and swap them into yen. To determine which is cheaper, the bank dealer must calculate the *all-in* rate of interest (cost) she would have to pay on yen obtained through a swap and compare that with the interest rate on a natural yen deposit.

The all-in interest cost on a currency deposit obtained by swapping another currency into that currency is the interest rate on the original deposit *minus* the gain (*plus* the loss) on the swap calculated as an annualized percentage rate. A swap is a sell-now-buy-back-later transaction, for example, like shorting a stock in February and covering it in June. On a swap transaction, the percentage rate of gain or loss is calculated as follows:

$$\frac{\text{Selling price} - \text{buying price}}{\text{Selling price}}$$

Since in the swap at hand (dollars into yen), the bank is going to sell dollars spot and buy them back forward, the percentage rate of gain or loss on the swap can be expressed as follows:

$$\frac{(\text{Selling price of \$s in the spot market}) - (\text{buying price of \$s in the forward market})}{(\text{Selling price of \$s in the spot market})}$$

This expression gives the percentage rate of gain or loss on the swap over the life of the swap. If the swap is for less than a year, as in our example, this figure will understate the annualized rate of gain or loss. To see why, note that, if it were possible to earn a 2% gain on a 6-month swap, then by repeating that swap twice during a year, one could earn 4% over the year. To calculate the *annualized* rate of gain (loss) on a swap that's outstanding less than a year, we divide the percentage of gain or loss on the swap by the fraction of the year that it's outstanding.

Let

t = days the swap is outstanding

Then with rates quoted on a 360-day-year basis,

$$\begin{aligned} & (\text{Annualized \% gain or loss on a swap of \$s into yen}) \\ &= \frac{(\text{selling price of \$s}) - (\text{buying price of \$s})}{(\text{selling price of \$s})} \div \left(\frac{t}{360} \right) \end{aligned}$$

If the spot rate for yen is quoted in the United States as 0.00870, that

means it takes \$0.00870 to buy one Japanese yen.¹² Since the spot rate for yen in this case is expressed in units of dollars per yen, it is the buying price of yen. To get the selling price of dollars, which we need in order to calculate the cost of the swap in our example, we have to invert the spot rate. For example, with the spot rate at 0.00870, the selling price of dollars is 115.00.

Let

S = *spot rate* for yen quoted in U.S. terms

F = *forward rate* for yen quoted in U.S. terms

Then, in a swap of dollars for yen,

$$\text{Selling price of \$s} = \frac{1}{S}$$

$$\text{Buying price of \$s} = \frac{1}{F}$$

Substituting these values into the formula derived above, we get

$$\begin{aligned} [\text{Annualized\% gain or loss on a swap of \$s into yen}] &= \left[\frac{\frac{1}{S} - \frac{1}{F}}{\frac{1}{S}} \div \frac{t}{360} \right] \\ &= \left(1 - \frac{S}{F} \right) \left(\frac{360}{t} \right) \end{aligned}$$

As we state above, the all-in interest cost of yen obtained through a swap equals the interest paid on the dollars borrowed *minus* the annualized rate of gain on the swap. Let

i_{yen} = all-in interest cost of the yen generated through a swap of dollars into yen

$r_{\$}$ = interest rate paid on the dollars swapped into yen

¹² When a foreign currency is quoted in terms of the amount of local currency required to buy a unit of foreign currency, that's called a *direct quote*. In our example, 0.00870 is the U.S. direct quote for yen; the Japanese direct quote for dollars would be *inverse*; 1 divided by 0.00870, or 115.0 (114.94 to be exact). In most countries, foreign-exchange (fx) rates are direct quotes. The United Kingdom, however, is an exception. There fx rates are *indirect* quotes which means that a British fx trader would quote the exchange rate between dollars and pounds as the number of dollars needed to buy a pound, which corresponds to the U.S. direct quote for pounds.

Then, in symbols,¹³

$$i_{\text{yen}} = r_{\$} - \left(1 - \frac{S}{F}\right) \left(\frac{360}{t}\right) = r_{\$} + \left(\frac{S}{F} - 1\right) \left(\frac{360}{t}\right)$$

To illustrate, we consider a numerical example in which 6-month dollars are swapped into 6-month yen. Assume that the spot rate is 0.00870; the forward rate is 0.00881; the interest cost of 6-month Eurodollars 5.35%; and the bid-asked quotes on 6-month Euroyen are 0.32–0.38%. Plugging the first three of these numbers (all quotes that prevailed in July 2006) into our formula, we get:

$$\begin{aligned} i_{\text{yen}} &= 0.0535 \left(\frac{0.00870}{0.00881} - 1 \right) \left(\frac{360}{180} \right) \\ &= 0.0535 - (0.01249)(2) \\ &= 0.0535 - 0.02498 \\ &= 2.85\% \end{aligned}$$

Because the forward yen is selling at a *premium*, the swap results in a gain. Thus, the annualized cost of the swap is negative, and adding it to $r_{\$}$ reduces i_{yen} below $r_{\$}$; still, borrowing dollars and swapping them into yen turns out to be significantly more expensive than buying 6-month yen at the offered rate of 0.6875%; in this case, taking the swap route doesn't pay.

Often, in other actively traded currencies, the cost of a Eurocurrency deposit obtained through a swap lies in the midrange of the bid-offered quotes in the interbank market for deposits of that currency in that tenor.

Swap: Yen into Dollars

Swaps, of course, are done not only out of dollars into a foreign currency, but out of a foreign currency into dollars. For example, had the swap been yen into dollars, then we would have been interested in the all-in interest

¹³ This formula does not take into account the impact of hedging interest that is earned in yen but paid in dollars.

cost of the dollars obtained through the swap. That rate can be calculated as follows. Let

$i_{\$}$ = all-in interest cost of the dollars generated by a swap out of yen
 r_{yen} = interest rate paid on the yen swapped into dollars
 Then

$$i_{\$} = r_{\text{yen}} + \left(\frac{F}{S} - 1 \right) \left(\frac{360}{t} \right)$$

In discussing swaps, we assumed that the yen was the foreign currency involved in the swap. The formulas we've derived are, however, valid for a swap between dollars and any currency.

Arbitrage

Arbitrage, strictly defined, involves buying at a low price in one market and selling simultaneously at a higher price in a second market. Swaps in the Eurocurrency deposit market are nothing but a form of arbitrage, one so widely practiced that it creates, except under unusual conditions, a very consistent relationship in each maturity range between (1) the interest differential at which deposits of a given currency trade relative to Eurodollar deposits and (2) the premium or discount at which the currency trades relative to the dollar in the forward market for foreign exchange.¹⁴

While it's true that a dollar is a dollar, there are, as noted in Chapters 6 and 7, subtle differences to U.S. banks between Eurodollars and domestic

¹⁴ The difference between the spot and forward rates at which a currency trades ($S - F$) is called the *swap rate*. Whenever short-term interest rates are lower on deposits of a nondollar Eurocurrency than they are on Eurodollar deposits, the swap rate on that currency quoted in U.S. terms will be *negative*, that is, that currency will trade at a forward premium. Moreover, because of the activities of arbitrageurs—institutions seeking to borrow at one rate and lend at a higher one—the size of the premium will be such that the cost of borrowing that currency and swapping it into dollars will equal or nearly equal the cost of borrowing dollars. Note that in our example of swapping dollars into yen, the interest rate on 6-month yen was lower than that on 6-month dollars, and the swap rate was accordingly negative:

$$0.00870 - 0.00881 = 0.00011$$

Because the swap rate is the difference between the spot rate and a specific forward rate, its size depends on the *tenor* of the swap transaction.

Whenever short-term interest rates are higher on deposits of a nondollar Eurocurrency than on Eurodollar deposits, the arbitrage will work the opposite way, making the all-in cost of borrowing dollars and swapping them into that Eurocurrency approximately equal to the cost of borrowing that currency directly.

dollars because of reserve requirements and FDIC premiums. Thus, to some degree the Eurodollar market is separate from the domestic money market, a situation that creates the possibility for arbitrage between the two markets.

ARBITRAGES BETWEEN THE U.S. MARKETS AND EUROMARKETS

In different maturity ranges, Eurodollar rates tend to be higher than U.S. rates most of the time. However, the tracking between U.S. and Eurodollar rates is extraordinarily close over time (Figures 18.7 and 18.8). Spreads widen and narrow and sometimes rates cross, but the main trends up and down are always the same in both markets. There's no doubt that this consistency in rates is the work of arbitrage, but that still leaves open the question of where the major impetus for rate changes typically comes from. Are changes in U.S. rates pushing Eurodollar rates up and down, or vice versa? A British Eurobanker's succinct answer: "Rarely does the tail wag the dog. The U.S. money market is the dog, the Eurodollar market, the tail."

The truth of this statement has created a foreign contingent of Fed watchers—in London, Paris, Singapore, and across the globe in the world's financial centers. Much as some bankers, especially foreign ones, would like to think of the Eurodollar market as an international market that responds largely to developments external to the U.S. economy, experience has taught them that whenever the Fed moves, its actions immediately affect the Eurodollar market. Consequently, to be successful, Eurodollar bankers must understand the workings of the U.S. money market and follow closely developments there.

Two sorts of arbitrages are used to link U.S. and Eurodollar rates, *technical* and *transitory*. Technical arbitrages are most important at the short end of the market, and opportunities for them have occurred because of the way Eurodollar transactions affected, because of institutional arrangements, the reservable deposits of U.S. banks buying and selling Eurodollars. Opportunities for technical arbitrage vanished with the movement of CHIPS to same-day settlement and payment finality.

Transitory arbitrages, in contrast, are money flows that occur in response to temporary discrepancies that arise between U.S. and Eurodollar rates because rates in the two markets are being affected by differing supply and demand pressures. Much transitory arbitrage used to be carried on by banks that actively borrow and lend funds in both markets. Another group whose activities tend to pull together U.S. and

Eurodollar rates are investors who shift from domestic to Eurodollar instruments and back in response to changing yield spreads. Finally, a growing number of borrowers, domestic and foreign, shift between the domestic and the Eurodollar markets in response to changes in the relationship between lending rates in the two markets. Their activities, too, hold rates together.

The Banks: Soft Arbitrage

In making funding choices, domestic versus Eurodollars, U.S. banks always compare relative costs on an *all-in* basis. The arbitrage that banks do between the domestic and Eurodollar markets is what one U.S. banker refers to as *soft arbitrage*. “What tends,” said this banker, “to tie domestic and Eurodollar rates together is that some banks have consolidated their funding operations into a unified operation that looks at sources of funds, both onshore and offshore, as alternatives. That is a form of soft arbitrage in that we are looking for the cheapest available source of funds. If we have a situation in which domestic rates are atypically low relative to Eurodollar rates, the bank will look at the domestic market as a temporarily cheaper source of funds, and vice versa. Also, we don’t look just at domestic versus Eurodollar funding opportunities at the bank level, but at opportunities for funding via commercial paper [at the holding-company level].”

Soft arbitrage is imprecise for several reasons. First, not every bank has unified its funding into one operation. Second, even a bank that has done so must be cognizant of certain constraints it faces in terms of market share and customer relationships. For example, a bank might feel compelled to take money that was a tad expensive out of one market as opposed to another so as to maintain its presence in the first market and so as not to floor the second market. Also, a bank might feel compelled to take money that was a tad expensive from a customer in order to maintain its relationship with that customer. Nevertheless, as we show earlier, there has been a clear preference among banks to borrow Eurodollars instead of fed funds.

Tight Overnight Rates: Fed Funds and Eurodollars

Without looking at actual spreads, one would expect the overnight rate on fed funds to lie a slim spread below that of overnight Eurodollars. A lot of the domestic entities that use the sale of overnight funds as a source of

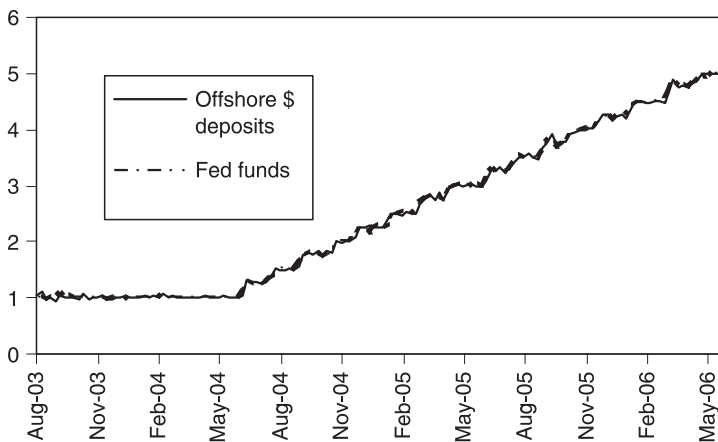
liquidity are small institutions that, because of concerns about credit and sovereign risk, have probably never established lines that would permit them to sell overnight Eurodollars; also, at least some sellers of funds may be barred from selling Eurodollars because they operate under rules that deem such sales to be prohibited “foreign” investments.

Still, at times Eurodollar overnights do trade expensive in relation to overnight fed funds (Figure 18.7). Sometimes, banks in Europe and the Far East end up long Eurodollars: maybe they have taken a rate view that led them to borrow 6-month Eurodollars; they are now long all this money and have to lend it short term until the rise in short rates that they anticipate occurs. Banks located outside the United States, as opposed to foreign bank branches situated in the United States, can’t sell fed funds as can domestic banks; so they lend overnight Eurodollars and, in doing so, may push the overnight Eurodollar rate below the rate on overnight fed funds.

In any case, there are enough globals that are free to operate in sufficient size in both markets so that the overnight rates on Eurodollars and feds cannot get too far out of line except on days when some temporary technical factor causes an aberration in one of these rates.

FIGURE 18.7

Overnight rates: offshore dollar deposits and the effective fed funds rate (in percentage points)



Source: Bloomberg, Federal Reserve

Bartolini, Hilton, and Prati (2005) find that studies showing differentiation between Eurodollar and fed funds rates may reflect a time aggregation bias, wherein the London-New York time lag causes Eurodollar rates to lead the fed funds rate. They note, for example, that, “Even if Eurodollar and federal funds rates move in the same direction during two consecutive days, the sampling lead of Eurodollars over federal funds rates would cause measured spreads to be serially correlated, even if federal funds and Eurodollar rates are identical at all times during the day.” Another factor that could explain the differentiation could be differences in the investor mix between London and New York, which can cause investors to assign different levels of risk to those they trade with. These differences would not exist if the Eurodollar market were fully integrated. The global nature of the Eurodollar market makes such integration highly unlikely, although most would say that it is closely integrated nonetheless.

Bartolini, Hilton, and Prati (2005) also find that some segmentation between Eurodollars and fed funds tends to occur on certain dates such as during the Fed’s biweekly reserve maintenance period, at quarter ends, days following 3-day holidays and FOMC meetings, and on the days surrounding the middle of the month. The researchers find, however, that the predictability of such segmentation disappears when data on the two markets are drawn entirely from the New York market instead of the London and New York markets, for Eurodollar rates and federal funds rates, respectively. One of the reasons is that when the rates are taken from the New York market alone, the spreads are apt to be more representative of a homogeneous market than when the rates are taken from both London and New York. This is because the London and New York markets differ significantly in terms of the payment methods commonly used by participants in the centers and because of differences in the mix of participants. For example, more of the Eurodollar transactions that take place in New York settle on Fedwire than is the case in London, where, as we previously noted, the vast majority of Eurodollar transactions settle through CHIPS.

The Spread of Commercial Paper Rates to LIBOR

To show the tracking between longer money market rates in the domestic and Euromarkets, a good comparison to make is between commercial

paper rates and LIBID. Today, a number of borrowers and investors are sensitive to this spread. If a bank's holding company deposits in its bank monies raised through the issuance of commercial paper, those deposits, just like any other deposit, are reservable and subject to the FDIC premium. However, if those monies are used to fund offshore operations of the bank, such funds are not reservable. In Chapter 7, we give an example of one bank strategy for using funds raised by selling commercial paper to fund bank operations offshore: It called for the bank holding company to sell commercial paper and then deposit the funds thus raised in its bank's Caribbean branch, which in turn used those deposits to fund a profitable portfolio of short- to medium-term securities, principally corporate. A bank that does this is clearly keeping a close eye on the rate at which it could raise Eurodollars of comparable maturity.

Also, U.S. banks are not the only banks to have discovered commercial paper. Issuance in this market by foreign banks is substantial. One example is ABN Amro Bank N.V., with assets in 2006 of over \$700 billion, among the most of any bank in the world. One of ABN Amro's subsidiaries, LaSalle Bank Corporation (LBC), is a registered bank holding company and the parent company of LaSalle Bank and LaSalle Bank Midwest, two of the largest financial institutions in the Midwest. Global banks such as ABN Amro, with their access to both the European and U.S. markets, clearly tend to pull U.S. commercial paper rates toward LIBID.

Another phenomenon that exerts a similar pressure, one that began years ago and has continued to grow, is the issuance of U.S. commercial paper by prime European corporates and government agencies, such as Electricite de France (EDF), one of the world's largest producers of electricity, generating 22% of the European Union's electricity in 2003. EDF was a government agency until 2004 when it became a limited-liability company, although the government still holds more than half the company's outstanding shares. For such borrowers, the alternative to U.S. commercial paper is clearly to borrow in the Euromarket at some spread to LIBOR.

More recently, the market in European commercial paper (ECP) has been growing strongly (Chapter 22). The French commercial paper market, for example, grew by about 50% in 1999 and by another 40% in 2000, before steadying the following year because of cyclical factors. By the middle of 2002, the European commercial paper market had grown by 40% compared to the previous year, with the total amount of ECP at \$300 billion,

according to data from the Bond Market Association. U.S. dealers have been quick to point out to their clients that it was in their interest to set up a global program that would permit them to issue not only domestic but European commercial paper. Doing so would permit them to get the cheapest rate worldwide and to enhance their investor base. Obviously, ECP trades at a spread to LIBOR. [U.S. dealers have also been pushing global programs in the burgeoning medium-term note (MTN) market, using the same pitch to issuers that they do in the commercial paper market. MTNs, as noted in Chapter 24, are a logical extension of the mode of commercial paper issuance to longer maturities.]

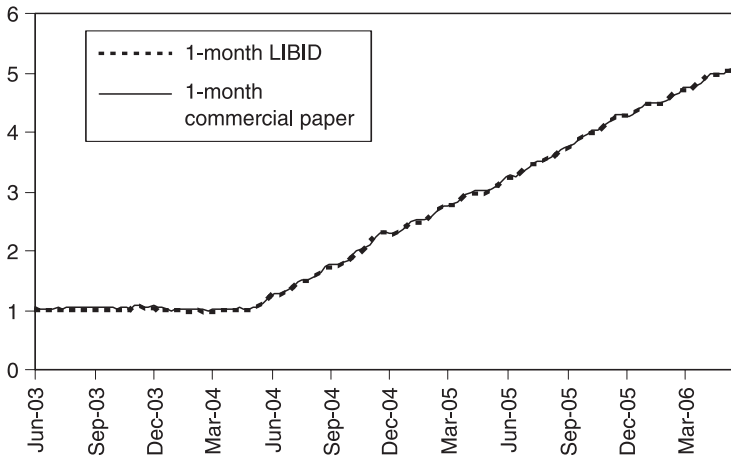
Investors too play their part in wedding domestic and Euro money market rates. Also, while ECP cannot be sold onshore to a U.S. investor, it can be and is bought by U.S. firms with foreign operations. If the treasurer's office at the head office of such a company runs its worldwide short-term portfolio on a consolidated basis, as some companies do, then the company can load up its offshore portfolios with ECP and reason justifiably that its consolidated portfolio is adequately diversified in terms of names held, sovereign risk assumed, and so on.

Given what we've said, the close relationships that prevail between commercial paper rates and LIBID in the 1-month and 3-month areas is not surprising (Figure 18.8). Today, most commercial paper is issued in the 30-days-and-under range. However, some big corporate finance companies do issue, at times in size, paper with 3- and 6-month maturities; also, bank holding companies would like to stretch some of their issuance to longer maturities, and they're doing so with some success as commercial paper investors gradually become more willing to extend to longer maturities.

A part of the problem of showing the closeness of U.S. and Eurodollar rates is that the instruments sold in the two markets are not exactly parallel. Also, with the advent of interest-rate swaps, a borrower can get to a bogey rate she wants to pay, say, LIBOR plus or minus a spread, by borrowing in the commercial paper market or by borrowing medium-term, fixed-rate and by then doing an interest-rate swap. This is precisely what banks do: they issue in the domestic market medium-term, fixed-rate, deposit notes and then do a swap fixed-rate to LIBOR. As an indication of the synchronization of domestic and Eurodollar rates in a longer maturity, one can run 2-year LIBID against the rate paid on 2-year deposit notes by prime American banks. Not surprisingly, the two rates track each other closely.

FIGURE 18.8

One-month rates: commercial paper and LIBID (weekly basis, in percentage points)



Source Bloomberg

While people may argue about just which Eurodollar-U.S. rate comparisons are most telling, it's clear that, today, borrowers and investors, both domestic and foreign, regard LIBOR, LIMEAN, or LIBID, as the case may be, as the benchmark rate against which they compare every short-term rate that they pay or receive.

REVIEW IN BRIEF

- The Eurodollar market is one that is truly global, with trading of Eurodollars active in all the world's major financial centers.
- London in particular has been a center for Eurodollar trading for decades; data from the Bank for International Settlements show, as of the first quarter of 2004, \$1.86 trillion, or 25% of all U.S. dollar liabilities of banks located outside the United States, were placed in banks in London.
- Foreign official holdings of Eurodollars stood at about 20% of all dollar reserves in the middle of 2004.
- Foreign official holders of Eurodollars face certain risks when holding dollar deposits in the United States, including litigation

risk, risks associated with international affairs, and diversification risks.

- Central banks also have many incentives for holding dollar deposits in the United States, particularly the deep liquidity of the U.S. markets. Nevertheless, yield has proven to be a powerful incentive to keep dollar deposits offshore.
- A *forward rate agreement* is an OTC variant of futures. The buyer promises to pay the seller some specified rate of interest during some specified future period on some specified notional sum.
- FRAs tend to be done in the 3-month to 12-month maturity range, generally in intervals of 3, 6, 9, or 12 months, the same as for Eurodollar futures.
- FRAs, since they are an OTC product, can be traded in any currency in which people want to strike a deal.
- FRAs have certain advantages over futures. For one, they are an off-balance sheet item. Second, they have flexible expiration dates. Third, FRAs can be traded using very little capital. They can also be traded in a variety of currencies, including those in which there is no equivalent in the futures market.
- FRAs contain very useful information about interest rate expectations. Malz (1998) identified a number of reasons why FRA and swap rates contain information on the so-called term structure of interest rates superior to that for government bonds.
- Eurodollar transactions that take place in London settle mostly through *CHIPS*; transactions that take place in New York settle mostly through *Fedwire*. In early 2006, roughly 95% of all U.S. dollar cross-border payments were settled through CHIPS.
- Some tiering of Eurodollar rates exists. This was apparent particularly in 1998 when investors assigned greater risk to holding Eurodollars in Japanese banks.
- Some trading in Eurocurrency deposits is generated by swaps, which are extensively used by banks to match assets and liabilities in their Eurobooks.
- In different maturity ranges, Eurodollar rates tend to be higher than U.S. rates most of the time. There are varying reasons for the rate disparities, but researchers find that studies showing a differentiation between Eurodollar and fed funds rates sometimes fail to isolate other factors that affect the spread.

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Interest-Rate Swaps

An *interest-rate swap* is a contract between two parties to pay and receive, with a set frequency, interest payments determined by applying the differential between two interest rates—for example, 5-year fixed and 6-month LIBOR—to an agreed-upon notional principal.

Put more intuitively, an interest-rate swap is a trade that produces, over time, the same cash flows that would be produced if party A were to say to party B, “You and I have different liabilities with the same maturity—let’s swap,” and the swap were done.

The swaps market has become humongous in size, surpassing by a wide margin the size of the global economy. At the end of 2005, the total notional value of interest-rate swaps outstanding was \$173 trillion, roughly a third of which matured in one year or less.¹

SOME HISTORY

A peculiar feature of interest-rate swaps is that they evolved out of more, not less, complicated instruments, namely, parallel loans and currency swaps.

Parallel Loans

The easiest way to describe a *parallel loan* is with an example. We’ll use dollars and sterling.

¹ Data obtained from Tables 19 and 21A of the Bank for International Settlements’ Semiannual OTC Derivatives Statistics report dated June 2006, via www.bis.org/statistics/derstats.htm.

In the post–World War II years before oil gushed from the North Sea, sterling was chronically weak; and to prop its value, the Bank of England imposed controls on the external use of sterling. One aspect of these controls was that a U.K. corporation that wanted to invest in the United States had to pay a premium price (\$/£ rate of exchange) to obtain dollars to do so.

Nothing spurs innovation like a regulation. Somewhere, probably London, some creative financial soul said, “There are, in this world, not just U.K. corporations that need dollar financing, but U.S. corporations that need sterling financing. Couldn’t a \$/£ swap be arranged between such firms on terms advantageous to both?”

The answer was yes, and the parallel loan was born. Sticking to essentials only, we can illustrate how such a loan worked as follows: Suppose that British Petroleum (BP), which has sterling balances, has a U.S. sub that needs dollars to fund an investment in the United States; assume also that IBM, which has dollar balances, has a U.K. sub that needs sterling to fund an investment in the United Kingdom.

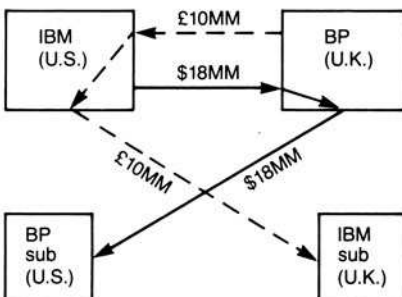
Finally, assume that the rate at which sterling trades in the *spot* market (market for immediate delivery) is \$1.80 per British pound.

One way BP could get dollars for its U.S. sub to invest without paying a premium would be for it to strike the following deal with IBM: BP agrees to lend to IBM’s U.K. sub £10 million; in exchange, IBM agrees to lend to BP’s U.S. sub \$18 million. That’s a parallel loan in a nutshell (Figure 19.1). Normally, a parallel loan has a fixed maturity, typically 5 to 10 years, and is structured as a *bullet loan* (all principal is repaid at maturity).

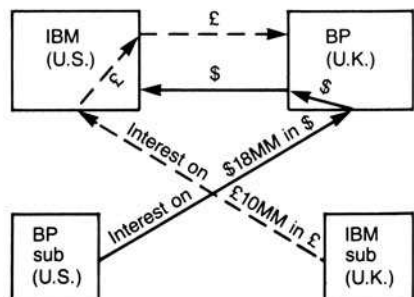
FIGURE 19.1

A parallel loan

A. Flows of *principal* at the outset of the loan; reverse flows occur when loan matures.



B. Directions of *interest* flows during the life of parallel loans.



Suppose in our example that the parallel loans made are for seven years at fixed rates. Then, IBM's U.K. sub would pay interest to BP on the £10 million the latter has lent it at the rate prevailing in the sterling market for 7-year, fixed-rate money. Similarly, BP's U.K. sub would pay IBM interest on its \$18 million loan at the going U.S. rate for 7-year, fixed-rate money. Normally, the payments of interest due on the two loans would be timed to occur at the same intervals, say semiannually, and would, in practice, occur simultaneously.

Sometimes, parallel loan agreements also contain a *ratchet clause* that calls for the interest rates paid on the loans to move, up or down, in tandem with interest rates in the countries whose currencies are involved, U.K. and U.S. interest rates in our example. The credit risk associated with a parallel loan is that one party will fail to make a payment of interest due or, at maturity, of principal plus interest due. To mitigate this risk, a parallel loan agreement typically contains a *right of offset* clause that gives each party the right to offset payments due it but not received against payments due from it. Prepayment provisions on parallel loans, if they exist, must be negotiated, since prepayment by one party of its loan would leave that party with an unsecured loan to the other party.

In our example, if the \$/£ exchange rate were to change over the life of the parallel loans, say sterling were to weaken, then the dollar value of BP's loan to IBM's U.K. sub would fall below the dollar value of IBM's loan to BP's U.S. sub. That in turn would cause IBM to suffer a foreign-exchange loss on its loan of sterling to BP; it would also expose IBM to credit risk. To preclude these consequences, BP and IBM could include in their loan agreements a *topping-up clause*: a clause that required that additional advances or repayments on one of the loans be made if the \$/£ spot rate were to move beyond some trigger point.

There is no reason why our example must be the respective subs of IBM and BP that need local-currency funding. It might be that it is IBM and BP themselves that need, respectively, sterling and dollar financing. In that case, IBM lends BP sterling and vice versa, and the deal is called a *back-to-back loan*.

The beauty of a parallel loan agreement is that it may enable one or both parties to use surplus balances of their native currency to finance an investment by a sub of theirs in a nonnative currency. A possible disadvantage of such an arrangement is that it puts a liability on the balance sheet of each party involved, thus making each appear more leveraged. This disadvantage disappears if the parties instead do a currency swap.

A Currency Swap

To illustrate a *currency swap*, let's continue with our BP-IBM example, only this time we will assume that the agreement struck between BP and IBM calls for IBM to *sell*—no liabilities this time—\$18 million to BP, which BP loans to its U.S. sub and for BP simultaneously to *sell* £10 million to IBM, which it loans to its U.K. sub. The assumed exchange rate is again \$1.80/£, so the two transactions are equal in value. Concomitantly, the parties agree to buy back the dollar and sterling amounts sold at the same exchange rate at a fixed future date. Over the life of the swap, which again might be 5 to 10 years, one party will make periodic net interest payments to the other at a rate that approximates the differential between specified sterling and dollar interest rates.

These rates can be either fixed or floating depending on the ratcheting clause, if any, in the agreement. We set our example in a period when sterling was a weak currency; consequently, the presumption is that sterling interest rates will be higher than dollar interest rates and that net interest will therefore flow in our example from BP to IBM.

The reader may find it helpful to note that a currency swap is structured similarly to a repurchase transaction. Recalling Chapter 13, we know that IBM, by entering simultaneously into a spot purchase and a forward sale, could reverse in governments; a currency swap boils down to IBM reversing not in governments, but in sterling. The flip side of the transaction is that BP repos interest-bearing sterling balances and receives, as collateral, interest-bearing dollar balances.

In a currency swap, risk is minimal: the right of offset is implied by the structure of the agreement; and exchange-rate risk can be handled, as in a parallel loan, through the inclusion of a topping-up clause.

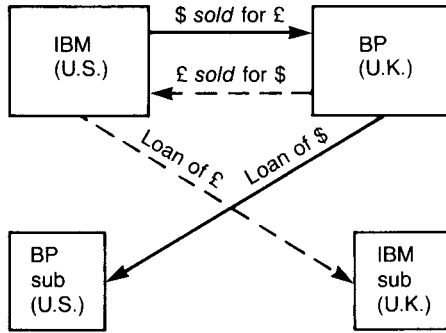
As a comparison of Figures 19.1 and 19.2 shows, a currency swap can be structured so that it accomplishes exactly the same thing that a parallel loan agreement would. A currency swap offers, however, several advantages over a parallel loan: it's mechanically simpler, and it puts no liability on the balance sheet of either of the contracting parties.

A company might opt to do a currency swap for any of several reasons: to mitigate exchange control regulations, to unlock a blocked currency balance, to lower its cost of borrowing a foreign currency, or to obtain financing in a currency that it is unable to borrow long term.²

² If a company acquires a balance of a foreign currency that it cannot, because of the host country's exchange controls, convert into its native currency, that balance is said to be *blocked*.

FIGURE 19.2

A currency swap*



*At expiration of the swap agreement, the IBM-BP sale (swap) of £ for \$ is reversed. IBM gets back its \$, and BP gets back its £, at the terms negotiated at the outset of the swap.

Central banks sometimes do interest-rate swaps to either manage their foreign-exchange reserves or adjust domestic liquidity.³ The use of foreign-exchange swaps by central banks has fallen off in recent years, partly as a result of the European Monetary Union (EMU) in 1999. For example, in a survey conducted by the Bank for International Settlements in 1997, 7 of the 14 central banks surveyed said that they conducted interest-rate swaps, 5 of which ceased such trading following the establishment of the EMU—Austria, Belgium, Germany, Italy, and the Netherlands.⁴

A COUPON SWAP

Analytically, the outcome of a currency swap is as if two parties had swapped liabilities denominated in two different currencies; in our example, it is as if BP had swapped with IBM a sterling liability of its own for an IBM dollar liability. Conceptually, there is no reason why two liabilities need be denominated in different currencies in order to be swapped on terms advantageous to the contracting parties. In around 1981 to 1982,

³ Leonardo Bartolini, "Foreign Exchange Swaps," Federal Reserve Bank of New York, *New England Economic Review*, Second Quarter 2002.

⁴ The Bank for International Settlements, "Implementation and Tactics of Monetary Policy," Conference Papers No. 3, March 1997.

this notion dawned independently on several bright groups operating in different world financial centers. Thus, interest-rate swaps were born.

An Example

The first type of interest-rate swap done was a straight *coupon swap*, a type of swap that's easy to explain. To illustrate, let's assume that Triple B, a U.S. corporation with a below-investment-grade credit rating, wants to finance in dollars an investment in plant and equipment. Dollar interest rates are uncertain, so to permit long-term budgeting and to protect itself against interest-rate exposure, Triple B wants to obtain medium-term, say 5-year, financing at a fixed rate.

Unfortunately, Triple B finds that because of its low credit rating, investors are none too eager to acquire its paper. In fact, if it were to float a 5-year, fixed-rate Eurobond, it would have to pay a rate of 5.85. Triple B's alternative is to get a term loan from its bank at a floating rate, say 6-month LIBOR + $\frac{1}{4}$.

Meanwhile, there exists a foreign bank—call it Double A—that wants to borrow floating-rate dollars; over the years Double A has learned in the school of hard knocks that to minimize its interest-rate exposure, it ought to make only floating-rate loans funded with floating-rate money. Double A is well liked by Eurodollar investors and could sell 5-year, fixed-rate notes at 5.375. Alternatively, it could borrow 6-month floating-rate dollars in the interbank market at LIBOR + $\frac{1}{8}$.

At first glance, it would appear that there is not much Double A could do for Triple B except to lend it 6-month money at LIBOR + $\frac{1}{4}$, fund that loan at LIBOR + $\frac{1}{8}$, and thereby make a scant $\frac{1}{8}$ for itself. Not so. There's a more interesting deal Double A and Triple B can strike.

Note that Double A can borrow fixed-rate, 5-year dollars in the Euronote market at a rate of 47.5 bp below the rate that Triple B would have to pay, whereas it can borrow 6-month, floating-rate money at a rate only 12.5 bp below the rate that Triple B would have to pay. Clearly, relative to Triple B, Double A has privileged access to fixed-rate money. This correctly suggests that the cheapest way for Double A and Triple B to borrow *jointly* (i.e., each borrows the same sum) \$10 million of 5-year, fixed-rate money and \$10 million of 5-year, floating-rate money would be for Double A to be the borrower of fixed and Triple B to be the borrower of floating.

This course of action has the disadvantage that it leaves each borrower with precisely the type of funds it did not want to borrow: Double A with

fixed-rate dollars; Triple B with floating-rate dollars. But, no problem. Enter the coupon swap. Double A says to Triple B: “I will offer you the following deal. You borrow at $\text{LIBOR} + \frac{1}{4}$ and sell me that debt at LIBOR flat. I, in turn, will borrow 5-year, fixed-rate money at 5.375 and sell it to you at 5.50. You’ll lose $\frac{1}{4}$ on your sale of LIBOR funding to me, but when you add that $\frac{1}{4}$ to the 5.5% I am going to charge you for 5-year, fixed-rate money, you end up with an *all-in cost* of funds of only 5.75; that’s 10 bp better than you could do if you borrowed 5-year, fixed-rate money in your own name.”

Double A is not being altruistic. As Table 19.1 shows, the deal enables Double A to shave 25 bp off the rate it must pay for 6-month money—to get such money at $\text{LIBOR} - \frac{1}{8}$ instead of at $\text{LIBOR} + \frac{1}{8}$.

TABLE 19.1

The Double A-Triple B swap, based on comparative advantage, produces a savings pie of 35 bp, which the two split: 25 bp to Double A, 10 bp to Triple B

A.	(1) Saving on 5-year, fixed-rate funds if Double A borrows them:	
	Rate to Triple B:	5.850
	–Rate to Double A:	<u>5.375</u>
		0.475 bp saving
	(2) Extra cost on floating-rate funds if Triple B borrows them:	
	Rate to Triple B:	$\text{LIBOR} + \frac{1}{4}$
	–Rate to Double A:	<u>$\text{LIBOR} + \frac{1}{8}$</u>
		12.5 bp extra cost
	(1) – (2) Net saving on paired borrowings:	
	47.5 bp – 12.5 bp = 35 bp	
B.	(3) Saving to Double A on the swap:	
	Cost to Double A of floating-rate borrowing:	$\text{LIBOR} + \frac{1}{8}$
	–Net cost after the swap ($5.375 - 5.50 + \text{LIBOR}$):	<u>$\text{LIBOR} - \frac{1}{8}$</u>
		25 bp
	(4) Saving to Triple B on the swap:	
	Cost of a term borrowing:	5.85
	–Net cost after the swap ($\text{LIBOR} + \frac{1}{4} - \text{LIBOR} + \text{LIBOR}$):	<u>5.75</u>
		10 bp
	(3) + (4) Total savings earned by Double A and Triple B on the swap:	
	25 bp + 10 bp = 35 bp	

A Free Lunch

The example we have just worked through, which, however the deal is worded, is the economic equivalent of Double A and Triple B selling each other their respective liabilities at prices that make the deal advantageous to both, seems to violate the “no-free-lunch” principle so dear to the heart of every economist. Actually, it does not.

In the nineteenth century, a famous British economist, David Ricardo, demonstrated that even if country A enjoys an absolute cost advantage over country B in the production of both wine and cheese, if A’s absolute cost advantage over B is greater in wine than in cheese, then it’s possible for both A and B to be better off (drink more wine, eat more cheese) if A specializes in the production of wine (in which it has a comparative cost advantage), B specializes in the production of cheese (in which it has a comparative cost advantage), and A and B trade: A’s wine for B’s cheese. That in a nutshell is the classic argument for free trade in *goods*.

What applies to goods also applies to money. Double A has a comparative advantage over Triple B in the borrowing of fixed-rate money, whereas Triple B has a comparative advantage over Double A in the borrowing of floating-rate money. If each borrower specializes in borrowing what it can borrow best, then each reduces its aggregate borrowing costs by the 47.5-bp advantage that Double A enjoys in the fixed-rate market *minus* the 12.5-bp disadvantage that Triple B suffers in the floating-rate market.

Subtracting 12.5 bp from 47.5 bp, we get 35 bp. By borrowing along lines of their respective comparative advantages and then trading via a swap the liabilities thus created, Double A and Triple B create a 35-bp pie of savings that they can carve up between themselves. That, moreover, is precisely what Double A’s proposed deal does. It shaves Triple B’s borrowing cost by 10 bp and Double A’s by 25 bp. Summing these savings, we get 35 bp, precisely the pie of rate savings to be split.

Trade based on a difference in comparative advantage, be it in goods or liabilities, is a *positive-sum game*.

EVOLUTION OF THE DOLLAR INTEREST-RATE-SWAP MARKET

The U.S. dollar interest-rate-swap market began in late 1981 with custom-tailored deals, often arranged by one or more intermediaries. The earliest such swap to achieve wide publicity was a swap of fixed for floating between Deutsche Bank Luxembourg and a lesser credit; through this

swap, arranged by Merrill Lynch and Credit Suisse First Boston, Deutsche Bank was able to obtain sub-LIBOR funding.

From this point on, interest-rate swaps looked like a great deal to everyone who could get involved. This group included intermediaries—banks and dealers—who, for a fee, (1) arranged such swaps and (2) *guaranteed* both sides of the swap. Major U.S. banks with their expertise in analyzing U.S. corporate and other credits were a natural for the intermediary business; such banks could with comfort accept the credit risk of dealing with many lesser credits, and at the same time, their names were acceptable to all potential swap parties. Today, other major participants in the interest-rate-swap market have broadened to include international entities such as the World Bank, federally related government-sponsored enterprises, mortgage-backed securities dealers, and hedge funds.

Inevitably, it occurred that an intermediary would have a customer who wanted to do one side of a swap but no customer who, at that precise moment, wanted to do the other side of the swap. To get real business done, intermediaries took to *warehousing* swaps: doing one side of a swap and holding the second side on their books until a customer came along who wanted that second side. To make warehousing practical and to minimize the risk inherent in this practice, swaps had to be made more tradable and thus at least a somewhat liquid product; this was done through *standardization* of swap terms. Those involved in this process knew that if standardization were to evolve quickly, it was best left to the marketplace rather than decided upon at the bargaining table between the various parties involved.

The Plain Vanilla Swap and the Importance of Netting

Standardization produced the *plain vanilla*, also known as *generic*, swap. A plain vanilla swap is a swap of fixed-rate for floating-rate dollars with a maturity ranging from 2 to 10 years. The fixed rate is typically quoted as a spread to recently auctioned Treasuries of a comparable maturity. The floating rate is typically 3- or 6-month LIBOR, and the fixed rate is quoted at a *spread to Treasuries*. For example, if the swap were done for five years, the fixed rate might be quoted as 5-year Treasuries *plus* 90 (bp).

Payments of fixed-rate and floating-rate interest due under the swap are due on the same day and are *netted*. Specifically, on each payment date—these occur *semiannually*—the party who is called, on that date, to pay the higher rate of interest must make a net payment of interest to the

second party. Since the floating rate in a swap may float above as well as below the fixed rate, the party who pays net interest in one period may well receive net interest in the next. Netting of interest payments in a swap achieves two important purposes: it reduces credit risk for all parties to the swap, and it reduces as well the usage by these parties of the credit lines that they have extended to each other.

The practice of netting has become nearly universal, and it has been one of the more important factors behind the growth of the interest-rate-swap market in recent years. The primary reason is that netting reduces the risks associated with interest-rate-swap contracts by exposing the counterparties only to the net difference between the cash flows associated with the swap.

ISDA and Other Forms of Master Documentation

In the early days of the swap market, would-be parties to a swap had to call in their lawyers who would then scratch their heads and try to think of all of the i's that had to be dotted and t's that had to be crossed in the negotiation and documentation of the swap agreement in order for their clients to get the deal they wanted. This was inefficient.

Today, most swaps, plain vanilla and others, are done using standard documentation, which itself comes in many varieties. Standardized agreements that have been widely accepted in recent years include: the PSA/ISMA global master repurchase agreement (English law), the TBMA master repurchase agreement (New York law), the ISDA master agreements, the International Foreign Exchange master agreement, the overseas securities lending agreement, and the EMTA master agreement for options on emerging markets instruments.

According to the Bond Market Association, these master agreements share several important elements:

First, each master agreement documents transactions that may be agreed orally between the parties and that are often subject to brief written or electronic confirmations of their financial terms, with the master agreement supplementing the economic terms of each trade. Second, series of transactions between two parties are encompassed in a single master agreement, with the master agreement providing common events of default or other termination events and giving a party specified rights in those circumstances. Third, these rights include, where appropriate, rights to: suspend further performance; terminate transactions covered by the master agreement; value each party's

positions; calculate these amounts in terms of a single base currency; liquidate any margin or collateral in support thereof; and set off each such amount against the other so as to determine a single net amount owed by one party to the other (a “Settlement Amount”).⁵

The International Swap Dealers Association (ISDA), which last amended its master agreement in 2002 (the first such revision since 1992), provides the full-calorie variety of swap documentation. Specifically, the ISDA has produced a fill-in-the-blanks master swap agreement that, when completed, becomes a signed contract. The clauses in the ISDA agreement and the blanks to be filled in cover every conceivable aspect of a swap: What are the dates on which payments shall be made? What are the dates on which the floating rate shall be reset? What are the termination provisions? What is a default event? How shall it be handled? Whose law shall govern—United Kingdom or New York State? If the floating rate is 3-month LIBOR, what reference rate shall be used? And so on. The new ISDA interest-rate-swap agreement has been beefed up from its 1992 version, which was 18 pages long; the 2002 version runs to 27 pages, and the ISDA takes many more pages to explain elsewhere just what is said in those 27 pages. Key areas of change include revisions to the calculation of early termination payments, as well as clarifications and simplifications to the payment netting provision.

Swaps with Bells and Whistles

We describe above the plain vanilla swap, which is much used. Frequently, however, a would-be swapper wants a swap with particular bells and whistles to fit its particular needs. This leads to the creation of swaps in flavors more numerous than those in which Baskin-Robbins dishes out ice cream. These swaps are known as *exotic swaps*. One example is the *collapsible swap*, which gives one party to the swap the option to cancel the swap if interest-rate levels begin to move in a way that is adverse to that party. A *quanto swap* enables a swapper to receive a floating rate in a foreign currency, say by paying the fixed rate in dollars and receiving a floating rate in euros. There are also swaps of prime against LIBOR (one of several species of floating-to-floating swaps), annual-pay swaps in which the floating rate is 3-month LIBOR compounded over a year, and so on.

⁵ Taken from the Bond Market Association, “Cross-Product Master Agreement Guidance Notes,” February 2000.

Fortunately, ISDA documentation is so flexible—has so many blanks to fill in—that it can be used to document swaps of all flavors.

Street-Speak in Swap-Land

The generic coupon swap is an absolute no-brainer—so simple that it is incredible that no one thought to do it before its beginnings. Jargon in swap-land is, however, another matter: most confusing at best. To help the reader, we have produced Table 19.2. The ISDA also publishes definitions of widely used terms for use in swaps transactions, derived from the input of market participants. The definitions enable participants to use shorthand in the details of their trade and in their trading confirmations.

The best way to fix in one's mind that a *bidder* for a swap is bidding for the right to *pay fixed* and that the *payor of fixed* is the *buyer* of (i.e., *long*) the swap is to recall the origin of the coupon swap: Good old Triple B, the weak credit, was struggling to *buy* fixed-rate money, which in some circumstances it might not be able to do directly at any rate;

TABLE 19.2

Street-speak in swap-land*

Bid/offer

- A *bid* is for the right to *pay fixed* (and to receive floating).
- An *offer* is for the right to *receive fixed* (and to pay floating).

A payor of fixed:†

- Pays fixed and receives floating.
- Is said to have *bought* and thus to be *long* the swap.
- Changes his interest-rate exposure as if he had incurred fixed-rate rather than floating-rate debt.

A payor of floating:

- Pays floating and receives fixed.
- Is said to have *sold* and thus to be *short* the swap.
- Changes his interest-rate exposure as if he had incurred floating-rate rather than fixed-rate debt.

Notional principal amount

- The dollar amount (e.g., \$5 million) to which the swap applies; this amount is neither paid nor received. Thus, the term *notional principal*.

TABLE 19.2—cont'd**Street-speak in swap-land*****Gross market value**

- The dollar amount of exposures, which is the absolute value of the positive and negative claims on all counterparties at current market prices.

Dates

- *Spot/next*: A spot/next swap (a.k.a. *spot-starting swap*) starts two days forward because LIBOR settles two days forward.
- *Trade date*: Date on which counterparties agree to do the swap.
- *Effective date*: Date on which agreed-upon fixed and floating rates start to accrue.
- *Maturity date*: Date on which agreed-upon fixed and floating rates cease to accrue.
- *Reset date*: Date on which the floating rate is reset.

Quotes on dollar coupon and other types of swaps

- *Money market swaps*: The *fixed rate* is an *absolute* rate quoted for some fixed period such as one year from “now,” one year starting in December (that’s Dec-Dec, pronounced deess-deess), and so on. The *floating rate* is typically 3- or 6-month liability LIBOR.
- *Term swaps*: The *fixed rate* is Treasuries plus a spread, e.g., 5-year Treasuries + 25 (bp). The *floating rate* is some money market index (e.g., 3-month LIBOR), usually *flat* (i.e., no spread).
- *A basis swap*: One floating rate against another, e.g., the commercial paper rate against LIBOR.
- *A commodity swap*: Cash flows are exchanged based on the price of a commodity.
- *An equity or equity index swap*: Payments between counterparties are determined by the performance of company shares, a group of company shares, or an equity index, such as the S&P 500.

*Some of the terms referred to as “Street-speak” are introduced later in the chapter.

[†]To reduce confusion, the terms *payor* or *receiver* have come always to refer to fixed. A *payor* (of fixed) may also be described as overbought, a *receiver* (of fixed) as overlent.

Double A, in contrast, had attractive borrowing alternatives and got into the deal only because it saw an opportunity to get funding at LIBOR flat.

The principal amount for which a swap is done and on which interest payments are due is referred to as the swap’s *notional principal*—notional because this amount is neither received nor paid. The amount of notional principal outstanding is much greater than the *gross* amount, which

provides a more accurate measure of the scale of financial risk in the swaps market. Gross market values basically represent the absolute value of the positive and negative claims on all counterparties at current market prices. At the end of 2005, the gross market value of interest-rate swaps outstanding was a relatively small \$4.864 trillion, a figure much smaller than the \$173 trillion of notional amounts we cite earlier. The exposures tend to actually be even smaller than the gross amount implies, because the figure does not take into account the availability of legally enforceable bilateral netting arrangements and other measures taken to reduce risk.

Another memory jogger is to think of swaps in *spread* terms. *Payors* (of fixed) benefit when spreads go out because they are *long* the spread. *Receivers* benefit when spreads come in because they are *short* the spread.

DEALERS AND BROKERS

Brokers got into the business of brokering swaps as early as 1983, and today brokers' screens show an active interdealer market in swaps that has expanded to the Internet. Although there are a fairly good number of swaps brokers, most of the volume is transacted by swaps dealers and the top-10 dealers account for most of the dealer volume. Nevertheless, dealers have been accounting for a smaller percentage of the volume in recent years, with the dealer share of trading volume in interest-rate derivatives falling to just under 50% in 2004 compared to about 60% in 2001 (Table 19.3).⁶ A few of the top dealers include Deutsche Bank, Credit Suisse, Bank of America, JPMorgan, Goldman Sachs, UBS, Citigroup, Morgan Stanley, and Merrill Lynch, among others. Top electronic trading platforms include eSpeed.com, TradeWeb.com, and Blackbird.net.

Brokerage on interest swap is currently as much as 1 bp per annum, and each side pays. It is, however, common for dealers to negotiate the maximum amount with their broker. Brokerage is paid up front.

The brokers' biggest clients are top swap houses, players that warehouse and actively trade swaps. When a swap trade is arranged through a broker, the scenario might go as follows: First, the two parties agree,

⁶ The Bank for International Settlements, "Triennial Central Bank Survey," on foreign exchange and derivatives market activity in 2004, March 2005.

TABLE 19.3

Global turnover in over-the-counter derivatives markets (daily averages, in billions of U.S. dollars)

	<i>Total</i>			<i>Foreign exchange¹</i>			<i>Interest rate²</i>		
	April 1998	April 2001	April 2004	April 1998	April 2001	April 2004	April 1998	April 2001	April 2004
Total reported gross turnover	1,988	2,168	3,509	1,573	1,356	1,989	415	812	1,519
Adjustment for local double-counting ³	-306	-306	-420	-235	-170	-231	-71	-136	-188
Total reported turnover net of local double-counting ('net-gross')	1,682	1,862	3,089	1,338	1,186	1,758	344	676	1,331
Adjustment for cross-border double-counting ³	-458	-520	-772	-379	-333	-466	-79	-187	-306
Total reported net-net turnover	1,224	1,342	2,317	959	853	1,292	265	489	1,025
with reporting dealers	763	826	1,191	614	503	696	150	323	494
local	306	305	419	235	170	231	71	135	188
cross-border	457	520	771	379	333	465	78	187	306
with other financial institutions	267	376	871	178	235	421	89	142	450
local	125	161	352	79	105	157	46	57	195
cross-border	142	215	520	99	130	264	44	85	256
with non-financial customers	193	140	248	166	115	169	27	25	79
local	125	89	133	108	75	102	16	15	31
cross-border	68	50	114	58	40	67	10	10	47
Estimated gaps in reporting ⁴	39	43	93	29	22	53	10	23	40

Continued

TABLE 19.3—cont'd

Global turnover in over-the-counter derivatives markets (daily averages, in billions of U.S. dollars)

Estimated global turnover	1,265	1,385	2,410	990	875	1,345	275	512	1,065
<i>Memo:</i>									
<i>Turnover at April 2004 exchange rates</i>	<i>1,350</i>	<i>1,600</i>	<i>2,410</i>	<i>...</i>	<i>...</i>	<i>...</i>	<i>...</i>	<i>...</i>	<i>...</i>
<i>Exchange-traded products⁵</i>	<i>1,382</i>	<i>2,180</i>	<i>4,657</i>	<i>11</i>	<i>10</i>	<i>23</i>	<i>1,371</i>	<i>2,170</i>	<i>4,634</i>

¹ Including outright forwards and foreign-exchange swaps.

² Single currency contracts only.

³ Made by halving positions vis-à-vis other local reporting dealers and other reporting dealers abroad, respectively.

⁴ Based on reported coverage.

⁵ Sources: FOW TRADEdata; Futures Industry Association; various futures and options exchanges.

Source: Bank for International Settlements

through the broker, to trade, say, a 2-year swap in the middle of the bid-offer spread. Next, the broker passes names to the counterparties so that they can do a credit check. That might be instantaneous, or it might take a little time. A guy might say, “I have to send this deal to my credit department to see if we can do it.” Brokers note that trades with the largest swap houses are essentially automatic, given their strong credits. New credit lines have to be established with other outfits.

Because interest-rate swaps are brokered on a give-up-name basis, swap brokers act strictly as *agents*. Unlike blind brokers of governments, swap brokers never acquire even momentary positions in the instruments they broker.

DEALER BOOKS IN SWAPS

When a dealer warehouses swaps, it creates positions, a *book*, in swaps: the dealer is long swaps A, B, and C; short swaps X, Y, and Z. By running a swap book, a dealer incurs certain risks. It does so to earn a reward—profits. Just how, makes an interesting story.

Risks in a Swap Book and Hedging

As long as a swap is in a dealer's book, that swap creates some *credit risk* for the dealer, just as its being an intermediary in a swap does. Whether the dealer sheds that credit risk when it trades out the swap depends, as noted below, on how it does so.

When the dealer positions a swap, a far more important and immediate risk for a dealer is *market risk*. To *sell* a swap, be the receiver of fixed, is equivalent to being *long* a bond. Consequently, if interest rates *rise (fall)*, the market value of the swap will *fall (rise)*, just as the market value of an equivalent bond would. A similar but opposite market risk devolves from being long a swap.

The market value of a 5-year swap that pays a fixed rate of 4.25 would, if the bid on the swap rose 12.5 bp to 4.375, fall by an amount approximately equal to the change that would occur in the market value of a 5-year note with a 4.25 coupon if the yield to maturity at which that note traded were to rise from 4.25 to 4.375, assuming there is an exact date match. Clearly, a dealer who runs a swap book containing hundreds of millions of swaps can easily incur lots of market risk.

To be a dealer in swaps does not, however, necessarily call for having courage, a rate view, and an affinity for taking positions and concomitant market risk. Dealers who run swap books—all big swap dealers have them—are of the opinion that they are neither paid to nor supposed to incur a lot of market risk. Dealers *hedge* their swap books. To hedge a long position in a particular swap, a dealer can go long a Treasury of similar duration. Conversely, to hedge a short position in a particular swap, a dealer can short a Treasury of similar duration.

Sometimes dealers do precisely this, but often they hedge using a pool concept. A long position in one swap may hedge a short position in another, so all a dealer really need hedge is his net exposure—the pools of fixed- and floating-rate money that will come in or go out in different future periods as a result of its swap positions. This approach to hedging is called the *zero-coupon approach* because in theory all cash flows in different periods could be hedged through purchases and sales of appropriate zero-coupon securities. Easier said than done. The first problem a would-be hedger finds is that it has these little mismatches of dollars, in and out, all over the place going out to 10 years. So the hedger must aggregate its cash flows over reasonable time periods, say quarters, and then

hedge its remaining mismatches. A second problem is supply and liquidity. There's a good case that the swap market is forward LIBOR. Thus, Eurobonds ought to make a better (less basis risk) hedge than T-bonds and notes. However, Eurobonds have associated credit risk; also, the issues are too small to be tradable. So a hedger of medium-term swaps is left using Treasuries because they're there and they're liquid. For short-term swaps, Eurodollar futures are, as noted later, the best hedge: they're for the same instrument, they're quoted on the same basis, and they're liquid.

When a swap-book trader hedges using Treasuries, he is left with residual spread risk because the spread at which swaps trade over Treasuries is not written in stone; it can and does change, sometimes significantly and unexpectedly. A glaring example is the behavior of the markets during the Asian financial crisis and following Russia's default in 1998. During that period, yields along the Treasury curve fell much more than swap rates did. The upshot was that swap traders who had sold swaps and shorted Treasuries as a hedge lost a bundle.

An Aside

At this point, the reader may be a trifle confused. In Chapter 6, we speak about banks using unhedged swap positions as a part of asset and liability management. Here, we are talking about dealers, nonbank and bank, hedging swap positions. Actually, a big bank is likely to be doing swaps in a big way in at least two different areas: the Treasury division and the capital markets or corporate finance group, which is people doing investment banking activities, mergers and acquisitions, asset and liability management for clients, underwriting of new issues, and so forth.

If a Treasury officer has the opportunity to sell a swap at a fixed rate of 4.5, what interests him is the *absolute level* of the rate he can get. He thinks of such a swap as a synthetic corporate bond financed at LIBOR and asks whether, given his view on rates, the swap is an attractive "asset" to acquire as opposed to buying straight Treasuries, buying corporate medium-term notes, or maybe doing nothing. His view on the value of the swap depends on his assessment of whether rates are likely to fall and on his assessment, if he's inclined to take on fixed-rate assets, of where relative value lies.

A bank's corporate finance division generates a lot of new swap supply in connection with its various activities; in particular, swap issuance,

at least in longer maturities, is often driven by securities issuance. A big borrower, maybe a sovereign, might issue \$750 million of bonds in the Euromarket and promptly do one or more swaps to create, on favorable terms, a *synthetic security* that has the characteristics it desires with respect to maturity, rate (fixed or floating), and currency of denomination.

When a bank's corporate finance group proposes a swap to a client, its objective is to sell product and services for a fee, explicit or implied in the pricing of the products sold. A bank's corporate finance officer neither has nor is supposed to have a view on whether the flip side of a swap he proposes to a client would be viewed as having value by a bank Treasury officer. A swap generated by the bank's corporate finance group ends up in the bank's swap book.

When the bank's swap-book trader looks at a swap, he is interested not in absolute rate level, but in *spread*. Assume that the market in the 5-year swap is 52 bid, 53 offered and that 5-year Treasury notes are trading at 5.10. A swap that pays 5.63 fixed is offered to the swap-book trader. He sees value in that swap not because it pays an absolute rate of 5.63, but because it pays 53 over Treasuries, whereas the offer in the swap market is 52 over Treasuries. In the prevailing market environment, a swap that pays 5.63 gives the trader 1 bp of protection.

A well-managed bank will try to coordinate its swap activities, so it does not end up running one swap book here and another there. Some banks succeed better at this than others. Also, it is common for a Treasury officer wanting to position a swap to ask his own swap desk for quotes; however, to keep that desk "honest," he's likely to ask for quotes from other dealers as well. Suppose a bank's Treasury wants to sell, say, a \$750 million, 5-year swap for asset-liability-management purposes, and that it does this trade with its swap book. The trader responsible for the swap book would in turn view that buy either as an offset to an existing position that he would otherwise have hedged or as a new position needing to be hedged. If the trader hedges the position, *net* the bank's new position is the hedge (a long position in Treasuries); but once the swap trader sells the swap and lifts the hedge, *net* the bank's position is the position that its Treasury initially put on, short the swap.

Above, we speak principally of money center banks that also may generate a lot of swaps out of their international banking facilities (IBFs). The superregionals are not active market makers in swaps. They are situation-driven institutions that will do swaps for their own asset-liability management and to cover business they do with their own customers. Consequently, such institutions may be in the brokers' market one day and then out for a while.

Trading Spreads and Making Profits

A swap-book trader is likely to say that his job is to trade spreads. What he means is that when he sells or buys a swap, he is looking to reverse that trade (buy what he has sold or vice versa) at a rate such that the bp spread he picks up on his trades into and out of the swap most often exceeds the narrow bid-offer spread that prevails in the interdealer market in swaps. “To make money on the swap desk,” noted one swap trader, “you must beat the market.”

Profiting from a Swap Book

An example: Again, suppose that the 5-year swap market is 52 bid, 53 offered. (If the *handle* were 5, this would translate to 5.52 bid, 5.53 offered.) That means that there is strong support from fixed-rate payers at around 52 *over* (Treasuries) and that there is support from fixed-rate receivers at around 53 *over*.⁷

In taking on positions in his swap book, a trader will likely be dealing with customers, not other dealers. So one way he can seek to profit is by trying first to buy a swap at the offered side of the market or better and to then sell it at the bid side of the market or better. In our example, if he did just that, he would pick up as profit at least the bid-offer spread of 1 bp. (Note, if the trader buys Treasuries at the bid side of the market and sells at the offered side, as he does when he puts on and takes off swap hedges, he would lose the bid-offer spread. This difference in outcome reflects the difference in how the swap and Treasury markets are quoted, yield versus price.)

To run a swap book, a dealer must incur a variety of costs, including the half 32nd he loses putting on and taking off hedges; he also must commit capital. A well-managed dealer will want traders in various areas to earn some minimum risk-adjusted rate of return on the capital they are allocated. Thus, a swap trader might end up needing to earn extra bp on positions he runs through his book in order to meet his firm’s target for its investment objectives. To do that calls for knowledge of who might want to do what, finesse, and patience. Also, even a cushy spread provides little margin to

⁷ The market in a Treasury note might be 21 bid, 21+ offered. That is consistent with our saying that being short a swap is equivalent to being long a bond. Whereas the swap market is quoted in terms of *yield*, the Treasury market is quoted in terms of *price*. Thus, 21 bid and 21+ offered for a 5-year Treasury note might be equivalent to 17 bid, 16½ offered if the bid and the offered for the notes were quoted in terms of yield, not price.

compensate a dealer for the real, if small, credit risks his swap desk incurs vis-à-vis its counterparties.

Achieving the Bogy

The whole idea of running a swap book is for a trader to create positions in which the rate he is getting has value itself because it is better than what the market offers. Put another way, the swap business is all about recognizing valuable cash flows and being able to hedge them.

To illustrate, we assume that the trader's firm is engineering an interesting transaction for or giving good advice to a client; as part of the deal, the client does a 5-year swap in which the dealer receives 54 over Treasuries at a time when the 5-year swap is 52 bid, 53 offered. Now, the swap trader has received a cash flow with value because it pays 1 bp more than the rate at which he could turn that trade in the brokers' market.

Maybe the swap trader received this cash flow with value because the payor of fixed had done a large bond issue and wanted a chunky swap (fixed to floating) that probably could not be turned in the market in one shot without moving the bid-offer. Or maybe the treasury division of his bank wanted to put on the swap, quickly, to make an interest-rate play.

To meet his bogy, our trader must trade out of the swap he sold at 54 over by buying it lower. Doing that may require time; enter spread-risk management. Immediately, our trader hedges by shorting 5-year Treasuries at 5.10. He now has residual spread risk: the spread of the swap curve to the Treasury curve might widen, but he has acquired a valuable cash flow giving him some protection against this.

To short Treasuries, our swap trader reverses them in from his repo (matched-book) desk and pays the desk the reverse or repo rate. Thus, while the swap remains in his position, he must pay out the coupon on the securities shorted and LIBOR; at the same time, he is receiving the fixed rate of 5.63 and the repo rate. Assume that the overnight repo rate is 5, and that 6-month LIBOR is 5.625. On the fixed-rate side, our trader is making 53 bp (5.63 on the swap minus 5.10 on the Treasuries). On the floating-rate side, he is losing 62.5 bp (5.625 minus 5). So *net* he has negative carry on his position of 12.5 bp. He is willing to accept this negative carry because he is holding and hedging a cash flow with value. However, he is conscious that he has yet another risk: the LIBOR-repo spread might move against him, thereby increasing his negative carry. (The 53 bp that he's earning on the fixed-rate side is written in stone.)

Because of negative carry and spread risks, our swap trader wants to turn his position, immediately if he can, by going the other way. To do so, he needs to acquire a fixed-rate liability at Treasuries plus some amount less than 53 bp. Maybe a big corporate is doing a floating-rate bond issue that it would be willing to swap, fixed to floating, at under 53 over. Or maybe the swap will have to be turned in small pieces. To be successful in the swap business, it is essential that a dealer have a strong marketing presence. “You really depend,” observed one trader, “on your knowledge of what clients need to do. You cannot sit in an ivory tower and look at absolute rate levels and developments in the macroeconomy and say, ‘Here is where rates are going,’ because you are not trading absolute rates. You are trading those spreads, and you have to know what everyone else in the market wants to do. Otherwise you cannot do big deals of the sort we do.

“If we underwrite an issue for the Kingdom of Sweden and they want to swap [fixed to floating] as part of the deal, we will probably warehouse part or all of the swap because we don’t have clients coming in the door wanting to go the opposite way in such size every day. We get some very chunky deals. We may sit on some of the swap. We will split it up into little pieces, maybe to European corporates. We may end up running Sweden against other issuers. Meanwhile, we have these repo-LIBOR risks that we have to manage. The other issuers might want to sell the swap because they have outstanding floating-rate notes that they want to swap into fixed rate or maybe because two years ago they had sold fixed-rate Eurobonds, swapped the proceeds into floating rate, and now want to get back into fixed rate because fixed rates have come down.”

The Beauty of a Hedged Swap Book

The marketing, investment banking side of the business is terribly important to running a swap book profitably; the swap-book business, in turn, enhances a dealer’s ability to do other businesses such as underwriting. “One big advantage we have,” noted one swap trader, “is that we can reduce absolute rate risk to zero, so we can stand there and make a price to our client. We do not depend, should a sovereign do a big bond issue, on the availability of a counterparty who is interested in acquiring that sovereign’s fixed-rate liabilities at exactly the rate level at which that sovereign is issuing. We can warehouse these things, sit on them for a time. We can make these positions, less our profit margin, available to our clients when it suits them rather than when it suits us and our rate view. That is the beauty of our fully hedged business.”

Assignment Brokering

Early on, dealers taking in and then trading out a swap would assume the position of swap counterparty to both the buyer and the seller of the swap; in doing so, the dealer guarantees each side's performance. Playing the role of credit intermediary exposes the dealer to credit risk and puts contingent liabilities on his balance sheet. Over time, swaps have become a much more negotiable instrument than they once were. Also, as the swap market has become liquid, especially in dollar swaps, margins attainable have narrowed. Consequently, dealers have difficulty getting the spread they require if they are to both deal and be a credit intermediary. Therefore, it is becoming common today for dealers to do *assignment brokering*, rather than play the role of credit intermediary.

Here's a dealer's example: "We will do a swap with Sweden. Then, another issuer comes along and says, 'We are interested in this position.' We say, 'Fine, you can take [have a credit line to] Sweden. Here is the price.' We end up putting the two together direct. We step out entirely—do not guarantee the other side's credit anymore. Obviously, in this case, we will work for a smaller margin."

Lifting a Leg

A bank tries to make money on its swap book by engineering a transaction with a client with whom it has a relationship and having that client pay by letting the bank receive at, say, 60 or 61 over rather than at the inside rate of slightly less than that rate. The engineering may involve structuring an interesting transaction and giving good advice on rates—adding value in some way. With swap spreads narrow and competition intense, this is difficult to do, which tempts a swap trader to try to enhance his margin by speculating. Like arbitrageurs and other traders, swap traders are tempted to lift a leg now and then. Take, for example, a bank dealer who has sold a big swap that pays fixed and has bought Treasuries to hedge. If his bank suddenly forms the view that rates are going up 50 bp, it is not going to then sit on \$500 million of Treasuries. It will sell some of them. "The positions that are created as a result of doing client swap business are," noted one trader, "also positions that we can now start to manage based on outright rate views. We have those positions anyway. That is why swap teams in most banks are now organizationally part of the trading division and report to the senior risk manager of the bank. Swaps are a natural way of taking positions and using those

positions either for spread trading or for speculative purposes. Our business is developing into a business where we do both.”

A Global Swap Book

Swaps are really a global business. A lot of foreign entities do dollar swaps, and a lot of that business is done in London and Tokyo, especially the highly structured deals. The top swap dealers all have offices in New York, London, and other financial centers. Thus, running a *global* swap book calls for some coordination. One dealer described his firm’s approach as follows: “The actual running of our dollar-swap book sits in New York. When London and Tokyo are open, we talk to them. They have authority to trade, but pricing and hedge recommendations are always sent out from New York to give them guidelines. Early in the morning, the London office may have a client who wants to do a dollar interest-rate swap. Our traders in London know more or less where the market is. The day before, we were talking to them late in their day; and we will have sent them an overnight e-mail saying, this is what went on in New York, and these are the prices at which we would deal. So our London traders take that information, make a decision about the client, do the trade, and execute a hedge in Treasuries. But the trader who’s responsible for signing off on the portfolio of swaps and hedges sits in New York.”

Dealers as Market Makers in Swaps

Above, we focus on how dealers in swaps seek to profit by working customer business, which is not so different from a trader of governments or some other securities seeking from a chain of trades in one or a related set of securities to end up with a profit. In addition, the big dealers in swaps also trade actively with one another in the brokers’ market in standard flavor swaps, Treasuries-over-versus-LIBOR, and others we mention below.

Often, an end user or trader of swaps who has a swap on that he wants to unwind will simply enter into the mirror image of that swap. Say he does a 5-year swap, fixed to floating; if a year later he does a 4-year swap, floating to fixed, he’s back, if rates haven’t changed, to where he started except that he has used up, for the four years his two swaps have to run, some of the credit lines he has to others and that others have to him. If rates have changed, either one party will have to make a cash payment to the other in

order for a mirror swap to fly, or the party unwinding will have to do a mirror swap at a new fixed rate that reflects his gain or loss on his initial swap.

Bank versus Nonbank Dealers in Swaps

While the ranks of top swap dealers include both bank and nonbank dealers, which are often referred to as investment banks, bank dealers have certain natural advantages. First, banks are able to analyze and deal with a broader range of clients than can investment banks that lack the facilities to do that kind of credit analysis. Second, banks have a vast natural funding capability; they are funding and gapping all the time, and consequently, they have a natural layoff for a lot of ancillary market products that investment banks do not have. Third, customers generally prefer the credit of a top bank to that of a top nonbank dealer; some will not even take the work with a nonbank dealer.

That is why a lot of investment banks are heavily involved in “broker-ing” swaps. They have the underlying corporate finance deals; they are the guys who bring new corporate issues to market; they are involved in LBOs (leveraged buyouts) and M&A (merger and acquisition) activity, both of which require swaps. An investment banker might shop the swap dealers to get the best prices he can on each piece of a trade for a client and then package those pieces and present the package to the client as a pass-through. A bank that gets involved in such a package is taking the name not of the investment bank, but of the client. For packaging various financial products into a single structured deal that meets the precise needs of its client, the investment bank gets a fee. Generally, the investment bank would prefer not to get involved in managing the client’s swap position; it is a structurer.

MONEY MARKET SWAPS

Swaps originated as a medium-term instrument, and our discussion of swaps so far has focused on such swaps. However, there’s also lots of activity in short-term money market swaps, much of it with a pronounced euro flavor. Money market swaps are widely used in the classic way (to reduce or lock in borrowing costs), as a tool for speculation, and as part of an arbitrage.

The IMM Swap

In discussing money market swaps, we focus first on what’s called *the IMM swap* (IMM stands for International Monetary Market, a division of

the Chicago Mercantile Exchange). The IMM swap is a swap of a 1-year fixed rate against 3-month LIBOR, where the 3-month rate floats. The swap is dubbed the IMM swap because the start, end, and three intermediate reset dates are set to coincide with the dates on which four successive IMM contracts for 3-month Eurodollars settle. The IMM swap itself has *no* futures component.

The popularity of IMM swaps reflects the fact that besides being a tool for doing classic swaps, they are also a great speculative instrument and a great arbitrage tool. IMM swaps are often done for *forward* dates; for example, in September, one might do the Dec-Dec (pronounced *deess-deess*) swap or even the March-March swap.

One beauty of the IMM swap is that there is no cost of carry provided the swap is closed out before it becomes effective. A second advantage is that there is a lot of liquidity in 1-year swaps done to IMM dates. Thus, someone who put on, in September, a Dec-Dec swap for *forward* settlement and wanted to close out that swap in, say, November would have no trouble doing the precise *mirror swap* (the closing out of a swap). A trader who does a 1-year swap that starts on a *cock, broken, or stub* date—all three terms denote a non-IMM date—will, if he tries to do a mirror swap, likely end up having to do a swap whose dates lag the dates in his initial swap; if this happens, his mirror swap will leave him with a small basis risk because he'll be in long and short swaps that aren't quite identical. Most times an IMM swap is put on as a *forward swap*; a swap that is put on for immediate settlement is called a *spot swap*.

A Money Market Swap Used in the Classic Way

The 1-year rate in the IMM swap is not 1-year anything. However, the rate will be close to 1-year LIBOR in the cash market, if the swap happens to be a spot-start swap, because if it were $\frac{1}{8}$ above or below that rate, opportunities would open up for arbitrage.⁸ Cash-market, 1-year LIBOR is not the only rate on which IMM-swap traders keep one eye glued. A second is the 1-year rate obtained by *compounding* the rates at which four consecutive IMM contracts are trading, that is, the 1-year rate implied by a specific *futures strip*.

⁸ On an IMM swap (for one year) that starts one or three months forward, the IMM swap rate can differ a great deal from 1-year LIBOR.

Not all banks have customer bases that provide them with enormous deposits. If they need dollars to fund themselves or to do arbitrages, they have to buy them. Thus, even if they have triple-A status, they often have to pay up slightly in the Eurodollar market to get funds. On a day when a major U.S. or foreign bank can fund itself at no worse than LIBID, a smaller bank might have to pay LIMEAN, the London Interbank Mean Rate, or even LIBOR. Thus, these smaller players have a special incentive to do deals that will shave their cost of funds.

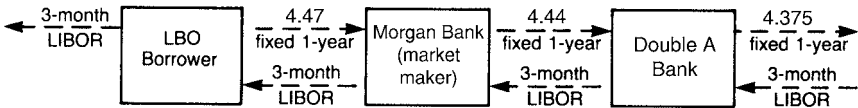
Suppose that, on a given day, a foreign bank takes a 1-year deposit at 4.375 and is looking to do a swap, 1-year fixed against 3-month LIBOR. JPMorgan Chase, a market maker in swaps, observes that the 1-year rate on Eurodollars implied by the nearby futures strip is 4.48, so it figures that it ought to be able to find a customer who would be a willing payer of that rate or something close to it. So Morgan offers the foreign bank—again call it Double A—a swap in which it will pay Double A 4.44 fixed and receive 3-month LIBOR. Immediately, Morgan hedges by buying the futures strip and thereby locking in a compounded annual rate of 4.48. It has done, warehoused, and hedged a swap. Next, Morgan looks for a final-demand customer who'd be willing to pay fixed. That customer might be an LBO borrower who wants relatively short-term debt because it anticipates selling off, over the short run, various assets of the corporation it is buying (Chapter 23 speaks briefly on the whys and hows of LBO deals). The borrower—we'll call him LBO—being a below-investment-grade credit, gets a bridge loan that is priced at a spread above 3-month LIBOR. LBO would like to fix its borrowing costs over the year; the margin between its anticipated net cash flows and the cost of servicing its debt is none too wide, so LBO doesn't want to run the risk of having to roll 3-month LIBOR in a rising rate environment. Accordingly, LBO is happy to do the following swap with Morgan: LBO pays Morgan 4.47 fixed for one year (1 bp below the rate implied by the futures strip) and receives from Morgan 3-month LIBOR (Figure 19.3). The moment this swap is done, Morgan closes out its futures hedge and, assuming no movement in futures, is looking at a 3-bp margin for its role as intermediary.⁹

Several things are interesting about this example. First, everyone seems to win. Double A has shaved its funding costs to 3-month LIBOR

⁹ If, however, futures have moved up, Morgan will have lost on its futures hedge, but, presumably, it will have profited from a matching increase in the fixed rate LBO is willing to pay it.

FIGURE 19.3

Paired money market swaps: Morgan earns 3 bp; Double A gets funding at LIBOR minus 6.5 bp; and LBO locks in a fixed rate of 4.47 for one year.*



*Labeled arrows indicate directions and rates of interest flows (see text).

minus 6.5; and if it can pick up some paper yielding LIBOR, maybe some bank CDs or a floating-rate loan, it will have locked in a spread of 6.5 bp—perhaps a few basis points more or less depending on the precise rate it gets on its investment. LBO is also happy because it has turned floating-rate funding into fixed-rate funding at a rate below what it would have had to pay if it had borrowed (providing it could) 1-year, fixed-rate money. This example, except for the maturities of the liabilities involved, is no different from the Double A-Triple B example presented early in this chapter. Double A, as a top-rated bank, has a comparative advantage in issuing fixed rate, but wants lower-cost, floating-rate money. LBO has a comparative advantage in issuing floating rate, but wants to reduce its interest-rate risk. Each borrows according to its comparative advantage; Morgan intermediates a swap between the two; and everyone walks away happy. This is about as classic an example of why the swap market exists as one can find.

In this example, Morgan of course is running a swap book. When Morgan does the swap with Double A, it warehouses that swap; and it does so with no guarantee that some customer will come along wanting the flip side of that swap. Still, Morgan is not running a big risk: it is in the market and has good origination staff members who are in touch with LBO and other players. The key to running a successful swap book, whether the swaps are short or medium term, is to have a nice two-way flow of both triple-A credits who issue fixed but want to pay floating and of lesser credits who borrow floating but want to pay fixed. For a market maker, the principal difference between the short- and medium-term swap markets is that the cast of players varies somewhat between the two markets.

Also, we should note that Morgan in meeting customers' needs for money market swaps will not always be dealing in *clean* swaps, that is, swaps done to IMM dates. A good portion of short-term hedges are spot swaps done to cock dates or odd dates. Thus, part of the spread a market

maker in swaps earns is a payment for assuming and managing the small basis risks that arise in its book because many customers want to do a cock-date swap, which the market maker covers two or three days later by doing a second odd-date swap that isn't quite the mirror image of the first swap.

Amending a Swap with a FRA

Suppose LBO is happy with his swap regardless of whether it is for one year or five years. Remember he is paying fixed and both receiving and paying LIBOR—a wash. Thus, to him where LIBOR goes is immaterial. Nonetheless, LBO might suddenly entertain a strong view that LIBOR is likely to drop in the short run. He does not want to undo his swap, but still, he wants to profit from the drop in LIBOR he predicts. Easily done. The next LIBOR reset is one month off, so LBO does a 1 by 4 FRA (forward rate agreement), which locks in the 3-month LIBOR he will receive at the next reset. By doing a FRA, LBO is reversing—for *one* reset period only—his initial decision to put on a swap. In fact, if LBO wanted to, he could, by doing a strip of FRAs, reverse his swap for *all* remaining reset periods.

This example suggests an interesting and correct observation: *a swap is a strip of FRAs, and a FRA is a single-set swap* (except for differences in settlement features). The first part of this statement says that just as one can build a swap out of a strip of futures, one can also build a swap out of a strip of FRAs; the reason is that just as one can calculate a 1-year fixed rate by compounding the rates on four consecutive IMM contracts, one can also calculate a 1-year fixed rate by compounding the rates on four consecutive FRAs (e.g., a 1 by 4, a 4 by 7, a 7 by 10, and a 10 by 13).

To see that a FRA is a single-set swap, consider the following example: A borrower paying 6-month LIBOR on a 1-year loan does a swap, fixed for floating. By the time he enters the transaction, he knows the first 6-month LIBOR rate he will get. Say it is 4.25, and the fixed rate he is paying is 4.44. Basically, what the borrower's swap does is to lock in an implied 6-month LIBOR rate, six months hence (all other rates are known with certainty). Thus, the borrower could accomplish the same thing by doing a 6 by 12 FRA.

Actually, the FRA and the swap are not quite the same thing. With the swap, there is a net cash flow at the end of the first 6-month period. For a pure speculator or arbitrageur, that cash flow translates to a cost of carry of about 19 bp. Normally, arbitrage between the FRA and the swap will bring the rates on the two instruments into a relationship such that a

trader will be indifferent to which he does. However, since different factors drive prices in the two markets, opportunities for profitable arbitrage occasionally arise.

This, by the way, is a classic case of arbitrage. Effectively, the same product, 6-month money six months hence, is being sold in two different markets as two different products and, occasionally, at two different prices. Only rarely, however, does an arbitrage between the 1-year swap and the 6 by 12 FRA yield a profit. The markets for both products are closely watched, and both are constantly traded in size. Also, many people track this arb because it's attractive: both sides of it contain off-balance sheet instruments, no money need be put down, and credit risk is minimal.

The IMM Swap as a Speculative Vehicle

Suppose an individual holds strongly the view that short-term interest rates will shortly fall and wants to bet on that happening. He could buy bills or agencies, repo them, and wait for rates to fall, at which time he could sell his paper at a profit and pay off his repo borrowing. Speculation in the cash market is simple, but it costs the speculator the bid-offer spread in the instrument he trades, and he must get financing. Alternatively, our trader might use futures to speculate, selling Eurodollar futures. To do so, he would have to pay transaction costs. More important, he would also have to put up margin; and, if rates should move much—even temporarily—against him, he would have to make additional variation margin payments, perhaps substantial ones.¹⁰ Yet a third way our trader could position for a fall in short-term rates would be to enter into an interest-rate swap. He could, for example, do a swap in which he would receive 1-year fixed and pay 3-month LIBOR.

The forward IMM swap is a great speculative vehicle—an ideal trading instrument. There is no cost of carry on an IMM swap provided the trader

¹⁰ The risk in variation margin calls is not one that a trader should treat lightly. Often, a trader will do an arb using one or more positions in futures in which he reasons: "Rates are out of whack; A exceeds B; but, as time passes, A must come to equal B." That this is true is no protection against A and B getting further out of whack in the short run and the trader having, consequently, to meet huge variation margin calls. Should this occur, the risk to the trader is that he will exhaust his funds before A and B move into line. A scenario of rates getting more, not less, out of whack over the short run has caused sleepless nights for—even emptied the pockets of—more than a few professional traders. Similarly, a correct view that short-term rates are coming down shortly does not preclude their taking, to a trader's peril, one more big bump up.

closes it out before it becomes effective. Also, so long as a trader does a *clean* swap (one to IMM dates), he will have no mismatch when he does a mirror swap. Because of these factors, the IMM swap has excellent liquidity. The only drawbacks to buying or selling an IMM swap and then doing a mirror swap are that the trader ends up with two credit exposures, and he also increases, by a small amount, his capital requirements. When a trader sells an IMM swap, he is making the same sort of bet that a bank's treasury does when it sells a 5-year swap; the difference is that the seller of a 5-year swap is betting that medium-term rates will fall, whereas the seller of an IMM swap is betting that short-term rates will fall.

Suppose a trader sells in September an IMM swap at 4.5; his view is that short-term rates will fall, and behold, the 1-year rate does fall to 4.25. Now he does the mirror swap and pays 4.25 fixed. On the swap at 4.5, he is paying 3-month LIBOR; on the swap at 4.25, he is receiving 3-month LIBOR; so the LIBOR flows wash. Thus, thanks to his offsetting swaps, he has net, with no rate risk, a 25-bp, through-the-middle profit.

The trader could just as well have bet that rates would rise. In that case, he would have bought the swap at 4.5 and hoped that the 1-year rate would rise to 4.75. If it did, the trader would again be able to take out a 25-bp profit.

A beauty of the IMM swap is that it allows a trader to assume one year's worth of risk in a single transaction; using futures, he'd have to buy or sell a strip of four futures contracts to get the same risk. Although the CME (Chicago Mercantile Exchange) offers a special contract designed to trade the popular 5-year swap that contains the economic equivalent of 20 quarterly Eurodollar contracts in a single contract, there are no other maturities available, which forces traders to trade strips of Eurodollar contracts. Another advantage of the IMM swap is that there is no initial margin and no margin calls.

The IMM Swap as the Leg of an Arb

In talking about money market swaps, we first looked at a classic swap (Double A-LBO) in which the market maker, Morgan, determined what fixed rate it was willing to pay and what fixed rate it thought it could get by calculating a benchmark rate, namely, the rate obtained by compounding a strip of four consecutive IMM rates. By taking a position in a swap and hedging it, Morgan created an arbitrage and made 3 bp.

A common arb that dealers and spec accounts do is to arb the IMM swap against a strip of IMM contracts. To illustrate, suppose that, in late

September, British Bank, a British merchant bank, figures that the Dec-Dec strip is trading on a compound basis at 4.45; it also observes that the Dec-Dec IMM swap is trading at 4.40. British Bank buys the strip as the asset side of its arb and buys the swap as the liability side of its arb. British Bank has thus set itself up to receive, December to December, 4.45 and to pay 4.40. If it rides that arb through that period, it will make a 5-bp profit minus transaction costs and minus any costs it may incur as a result of margin calls. What happens to 3-month LIBOR is to British Bank immaterial. If it rises, British Bank will lose money on its position in futures, but that will be matched by an increase in its net cash flow from the swap on quarterly reset dates. However, the bank's hope is that, sometime before its swap becomes effective, the compounded strip rate and the 1-year rate in the IMM swap will trade on top of each other. If that occurs, the bank will close out its position in futures by selling its strip, close out its swap by doing the mirror swap, and be left with a 5-bp profit.

To illustrate, suppose that, in November, the compounded rate on the Dec-Dec strip equals 4.43 and that the Dec-Dec swap is also trading at 4.43. British Bank bought its futures strip at an effective rate of 4.45; by now selling that strip at 4.43, it makes two 1-year bp.¹¹ Simultaneously, British Bank sells a swap that's a mirror to the one it bought. In that swap, it was to receive 1-year fixed at 4.40. Now, it sells a more valuable swap in which the receiver of fixed is to be paid 4.43. Again, British Bank picks up two 1-year bp, for a total of four 1-year bp.

Money market swaps occur in what could rightly be called "arbitrage-land." Traders arbitrage swaps against futures, swaps against cash, swaps against FRAs, FRAs against futures, and so on. Arbitrage opportunities keep arising because these related markets are constantly affected by many different events. Maybe an Asian bank does a big cash-and-swap arbitrage, which drives up the swap market; this creates profit in the swap-FRA arbitrage, so someone does the swap-FRA arbitrage, which drives up FRAs; this creates profit in the FRA-futures arbitrage, so someone does the FRA-futures arbitrage, which drives up futures. An event that moves one rate causes a rate ripple that creates some basis points for every player except maybe the futures player if he is an unhedged spec. Clearly, someone loses, usually the spec player in the futures pit.

¹¹ Recall from Chapter 15 that futures are priced in terms of an index: 100 minus yield. Thus, when yield falls, futures prices rise.

Needless to say, every active player in the markets we have been describing—swap, cash, futures, FRA—requires at least one person to constantly monitor rates in these related markets and computer systems designed to crunch rates and to identify arbs.¹²

The brokers love arbs between FRAs, cash, futures, and swaps, because so many of them are done and because, each time one is done, the arbitrageur must do at least two things at the same time—buy this, sell that.

Basis Swaps: Floating to Floating

Swaps are done not only fixed to floating, but floating to floating. Whenever a swapper does a *floating-to-floating* or *basis swap*, he is, in effect, *swapping spreads*.

In Chapter 23, we talk about the use of commercial paper to provide not only construction financing for a building, but also to provide long-term financing in lieu of conventional mortgage financing. An issuer whose paper was regarded by investors as top notch might reason, “I can do this and not worry about liquidity; also I do have bank backstop lines. However, short-term rates can be pretty volatile, so maybe I had better do a swap, floating to fixed, to cut my interest-rate risk.” The workhorse swap, fixed-to-floating or vice versa, is of course the LIBOR-versus-Treasuries-over swap described earlier. Our commercial paper issuer does this swap but finds that he now has a new problem. He is now paying Treasuries plus (a fixed rate) receiving LIBOR, and paying the commercial paper rate. Thus, he has basis risk: if the spread of LIBOR to the commercial paper rate narrows, that will cost him money. So he does another swap to reduce the uncertainty associated with his funding costs: he swaps, at a spread, LIBOR for the commercial paper composite index. His paper may sell a touch above or below this index, but at least he knows that it is not going to sell far from it. By *cocktailing* (stringing swaps together) two swaps, our commercial paper issuer has fixed his funding costs long term, presumably at a spread below the Treasuries-plus rate he is paying, since commercial paper normally trades at a spread below LIBOR.

¹² Anyone wanting to identify and do money market arbs of the sort we’ve been describing needs to be concerned with things such as day-count problems, residual basis risk, and cost of carry where it arises. For break-even formulas and benchmark calculations, see Stigum and Robinson’s *Money Market Calculations*, McGraw-Hill, 1996.

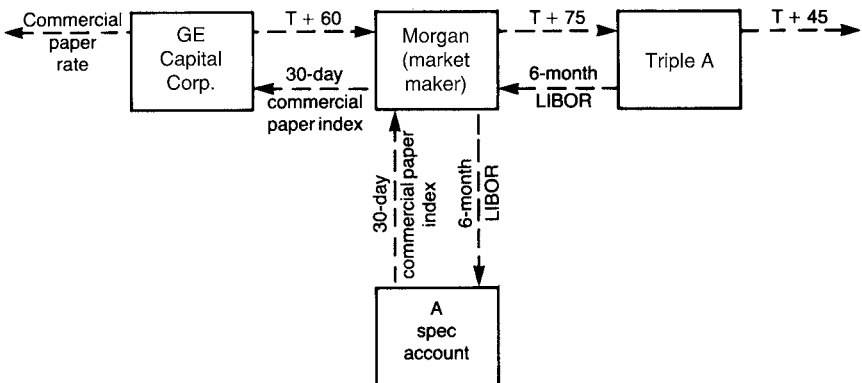
Here's a second example complete with market maker. Triple A wants to issue fixed to take advantage of its good name to get sub-LIBOR funding, but it wants to pay floating because it thinks that rates are going to fall. So it issues Eurobonds at Treasuries +45 and simultaneously does a swap with Morgan; under the swap, Morgan pays Triple A Treasuries +75, and Triple A pays 6-month LIBOR, which net gives it funding at 6-month LIBOR -30 (Figure 19.4).

Morgan now has a swap to work off. Next in the door comes GE Capital Corp. (GECC). GECC has a contrary view: rates are going up—it takes two views to make a market. GECC, a big direct issuer of commercial paper, does a swap with Morgan where it pays Morgan Treasuries +60, and Morgan pays GECC the 30-day commercial paper index.

Now Morgan is warehousing two swaps that don't match up, but customers keep coming in the door. The next is a spec account; it thinks that the commercial paper-LIBOR spread, which in this example is normally 20 to 30 bp (with LIBOR being the higher of the two rates), is going to widen to, say, 40 bp, that is, that LIBOR is going to rise relative to the commercial paper rate. So it does a swap with Morgan in which it receives 6-month LIBOR and pays the 30-day commercial paper composite rate +30. If the spec account is right and the commercial paper-LIBOR spread widens to 40, it will do a mirror swap and take out a 10-bp profit.

FIGURE 19.4

Morgan, a market maker, does offsetting swaps—fixed to floating, floating to fixed, and floating to floating—to earn net 15 bp*



*Labeled arrows indicate direction and rate of interest flows (see text).

Alternatively, the fourth party might be a bank that had previously done a swap under which it is paying 6-month LIBOR and getting the commercial paper rate +40. Now it wants to lock in a 10-bp profit on that swap by doing the mirror swap at the commercial paper rate of +30.

In any case, Morgan makes net 15 bp, assuming all payment and recent dates are semiannual. To earn that, Morgan has had to do some interim managing of spread risks, has had to use up some of its credit lines, and has had to allocate some capital to support its swap business.

Deposit Notes and Other MTNs

Bank issuers of deposit notes (domestic and foreign) are big swappers. Often, they will issue fixed-rate deposit notes with a minimum maturity of 18 months to reduce applicable reserve equipment to zero. What they really want, however, is floating-rate money. So they do a plain vanilla, LIBOR-versus-Treasuries-over swap to get sub-LIBOR funding.

Depending on market conditions and on their name, corporates and other nonbank issuers of MTNs (medium-term notes) might go either way; sell fixed and swap to floating or vice versa.

SWAPTIONS

Whoever said “There’s nothing new under the sun” was not a devotee of money market jargon. “Swaption” is still not in Webster’s or the Oxford English Dictionary *yet*, but it is well known on the Street. A *swaption* is an option on a swap. Most swaptions are capital-market products that arise out of the issuance of medium- or long-term securities; for this reason, we limit our discussion of swaptions to one example.

Suppose a U.S. corporate wants to issue 7-year paper. Also, it wants to add a 5-year call feature to that paper so that, if rates fall, it can reduce its funding cost. Adding that call feature will increase by, say, 10 bp the rate that our corporate must pay for 7-year money. That’s not much, but the typical investor in corporate paper, especially in the United States, does no sophisticated analysis of what granting a call option is worth. He reasons, “It’s 7-year paper that they might call in 5 years. I am getting 10 bp extra; and if they call the issue, I’ll buy something else.” That is his level of analysis.

Assume our issuer sells 7-year paper with a 5-year call feature. Next he does a swap, fixed to floating. On a straight 7-year swap, the fixed rate he would receive would be Treasuries +70. However, he makes the swap

callable after five years (i.e., if he throws in a swaption), and the fixed rate he receives is not Treasuries +70, but Treasuries +90. In other words, by selling as a swaption the option that he “bought” when he issued callable paper, he gets 10 bp more for it than he paid for it, which reduces by a like amount his all-in funding cost. Great deal, but how does this occur in efficient markets? The answer is that, whereas the buyer of corporate paper fails to analyze the value of the option he is granting, the receiver of the swaption is knowledgeable about volatility, Black-Scholes pricing, and all that, so he assigns to the swaption a value in line with its true economic worth.

Our corporate issuer had reduced by 10 bp his all-in cost of funding. Also, he isn’t concerned about the impact of the call feature on his liquidity. He wouldn’t be doing this deal if he were not a good credit; so he reasons: “If rates fall and the swap is called in five years, I will call my bonds and issue new 2-year notes, which I’m confident I can do.”

If what our corporate really wanted to do was to pay fixed, he could issue fixed-rate callable paper, do a fixed-to-floating swap with a call feature to garner 10 bp, and then do a second swap, floating to fixed.

Note that the principle involved in our swaption example is the same principle on which banks rely in selling capped CDs: there are basis points to be made whenever an option or a series of them (i.e., a cap) is underpriced in one market but correctly priced in another.

Paring funding costs is not the only reason a party might want to do a swaption. A second may be to hedge an asset or a liability that may or may not materialize within a certain time. A mortgage-backed security would be such an asset. Swaptions are used by investors to hedge prepayment risks associated with mortgage-backed securities. On the liability side, swaptions are essentially used as insurance to hedge interest-rate exposures. For example, for a company planning to take a 3-year bank loan in three months’ time, it can purchase a swaption that gives it the right to receive a floating rate such as LIBOR and pay a fixed rate for three years in three months’ time. The company would exercise the option in the event that the swap rate is above the fixed rate on the date the company obtains funding. Finally, a spec might want to buy or sell a swaption as an outright punt on rates, making an outright bet on the direction of interest rates.

CROSS-CURRENCY SWAPS

A *cross-currency swap* occurs, for example, when a borrower wants to borrow, say, fixed-rate Japanese yen and swap them into fixed-rate dollars.

Cross-currency swaps are considered plain vanilla swaps, a simpler, more sophisticated, and more flexible version of the back-to-back and parallel loans people did years ago. Generally, cross-currency swaps are done off bond issuance, and for that reason, we confine our discussion of them to several short examples.

A successful cross-currency swap, like a generic coupon swap, usually turns out to be based on differences in the comparative advantages in borrowing of two or more entities. To illustrate, suppose that Lufthansa wanted to raise \$750 million to buy some airplanes in the United States. As the German flag airline, it has better access to the Eurocurrency sector of Europe's bond market compared to many issuers outside of Europe. Also, from a technical point of view, it has strong loyalty from its underwriters—more leverage with them than it would have if it did a U.S. dollar-denominated Eurobond issue. Thus, for Lufthansa, the cheapest way to get fixed-rate, medium-term dollars would surely be to borrow fixed-rate euros in the European bond market and then swap them for fixed-rate dollars of the same term. A market maker, such as Citigroup, Morgan, whoever, would through its market presence be able to find a party wanting to do the flip side of this swap.

Another factor that often plays a role in cross-currency swaps is government rules and regulations of one sort or another. Here is an example: Before the advent of the euro in 1999, the government of Spain once had a rule that no one could issue Europeseta bonds. At one point, it partially relaxed this rule and said that supranationals, such as the World Bank, the European Investment Bank, the Inter-American Development Bank, and a few others, could issue such bonds. Some of these supranationals did just that, and their issues—a scarce commodity—commanded excellent terms. However, none of these borrowers wanted pesetas. It thus turned out that the few banks that had good underwriting ability for peseta bonds, good swap capability, and sufficient local presence in Spain to find end users of long-term pesetas were able to earn fat spreads.

Actually, finding demand for long-term pesetas was easy for a bank with the right contacts; Spanish corporates had an enormous, unmet demand for long-term, fixed-rate pesetas, since no long-term bond market existed in Spain outside of the government bond market. The upshot was that the World Bank swapped the pesetas it raised into long-term Swiss francs, Eurofirma swapped its pesetas into floating-rate Deutsche marks which they onlent to Deutschebank, and so on. The flip side of these swaps was taken by Spanish corporates. Spain's action resulted in windfall

profits to outsiders, but Spain got what it wanted: prestige borrowers to open the European bond market. Spain's view was, "We are liberalizing our economy. This is a first. We want no disasters, please."

Often cross-currency swaps call for cocktailing. A borrower with good access to the Swiss bond market may really want floating-rate dollars. If so, it will borrow fixed-rate Swiss; then, it will either swap (1) to fixed-rate dollars and then to dollar LIBOR or (2) directly to dollar LIBOR.

When a market maker in cross-currency swaps arranges such a swap, it goes into his book of cross-currency swaps which he seeks to manage much as he manages his dollar-swap book: without interest-rate risk and without currency risk. Dealers do take lots of currency risk, but they try to confine their taking of it to their foreign-exchange desks. To be a market maker in cross-currency swaps, cocktailled or straight, a dealer needs a wider market presence and even sharper risk management and hedging skills than he does if he just runs a dollar-swap book. For one thing, a dealer who books a swap denominated in a foreign currency with a relatively inactive government bond market will have difficulty hedging. So he ends up punting every time, like it or not.

Still, dealers keep pursuing cross-currency swap business. An amazing thing about plain vanilla, dollar, coupon swaps is that, transparent as the inherent arbitrage is, they still have not been arbitrated away. However, to earn a good spread, a market maker must work at least a little, if not a lot, harder.

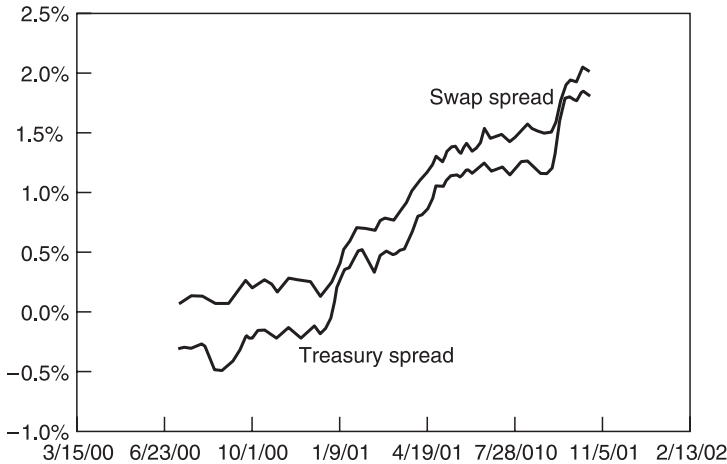
If one were to diagram a cocktailled cross-currency swap, one would likely find the market maker dealing with at least three counterparties, as did Morgan as shown in Figure 19.4.

THE SWAPS CURVE

A yield curve can be drawn for swaps; that is, independent of the Treasury yield curve. One view of a swap (the fixed-pay side) is that it is a *synthetic corporate bond*. This view leads to interpreting the swap yield curve as a yield curve for synthetic corporates. Another interpretation of the swap curve is that it is the Eurodollar yield curve for long dates. The "swap rate" curve reflects the fixed-rate portion of a plain vanilla swap against the floating leg of a 6-month LIBOR. Like the Treasury curve, it is a curve that is readily obtainable, owing to the large amount of swaps outstanding for each maturity along the yield curve. The swap rate curve also closely tracks the Treasury yield curve, as shown in Figure 19.5. One notable

FIGURE 19.5

Term spreads for Treasuries and swap markets from March 2000 to February 2002



Sources: Federal Reserve Bank of Cleveland, Bloomberg

aspect of Figure 19.5 is that while the Treasury yield curve inverted during the latter part of 2000, the swap rate curve did not. This reflects a basic principle of the credit markets: the yield curves on instruments that are riskier than Treasuries rarely invert, owing primarily to differences in credit risks.

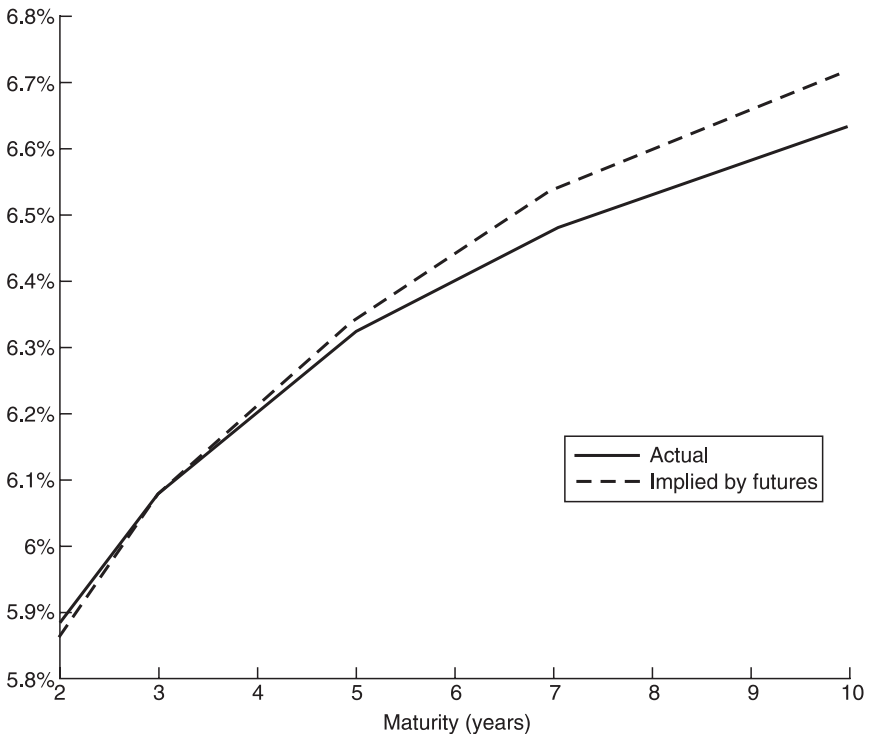
Many use the swap rate curve as a benchmark, in part because of the transparency of swap rates. Another reason is the dual nature of the risks associated with interest-rate swaps.¹³ We note below the “riskless” nature of interest-rate swaps given the strong credit quality of the counterparties and netting practices, and because there is no principal to default on. Standing in contrast, another key characteristic of interest-rate swaps is that they are tied to a rate not considered risk-free—LIBOR. Having dual elements of safety and hedging capability gives the interest-rate swaps market appeal. Moreover, with swaps tied closely to LIBOR, they have additional appeal, since the Financial Accounting Standards Board has given LIBOR status as an acceptable benchmark.

¹³ Joseph G. Haubrich, “Swaps and the Swaps Yield Curve,” Federal Reserve Bank of Cleveland, *Economic Commentary*, December 2001.

The swap rate curve can be obtained either by using swap rates or those implied by the Eurodollar futures market.¹⁴ Figure 19.6 shows a comparison between the swap rate curve derived from rates quoted in the marketplace and the swap rate curve implied by the Eurodollar futures market. As the chart shows, the rates are nearly the same for maturities of up to four years when factors such as convexity begin to have influence. Another influence

FIGURE 19.6

Actual swap rates and swap rates implied by Eurodollar futures—average swap curve, January 1994–March 2002



Note: For each maturity listed in the horizontal axis, the figure shows the average actual swap rate and the average futures-implied swap rate over the entire January 1994 to March 2002 sample. The underlying data are composed of weekly observations.

Source: Federal Reserve Board

¹⁴ Antulio N. Bomfim, "Counterparty Credit Risk in Interest Rate Swaps during Times of Market Stress," Federal Reserve Board, *Finance and Economics Discussion Series*, March 2003.

beyond the fourth year could well be the waning amount of volume and open interest in the Eurodollar contracts that generally occurs at that point.

Strengthening the case for using either the market-based or Eurodollar-based swap rate curve, as well as the notion that investors assign very little counterparty credit risk in the swaps market, is the way in which both curves have behaved during times of market stress. Bomfim (2003) notes that during the 1998 Asian financial crisis, “the nearly one-to-one relationship between synthetic and market swap rates remained relatively intact.” Bomfim sees this as evidence indicating that the netting practice and credit enhancement measures prevalent in the swaps market have considerable influence “in the mitigation of the role of counterparty risk in the determination of swap rates.”

COUNTERPARTY RISK

A major factor in the growth of the interest-rate-swap market has been the low degree of counterparty risk assigned by participants in the swaps market. To quantify the impact, Sorensen and Bollier find that adjustments to swap rates tied to counterparty credit risks can range from less than 1 basis point to more than 15 basis points, although adjustments of more than 10 basis points tended to correspond to swaps arranged with speculative-grade firms, parties that are not typical of the swaps market.¹⁵ There is a variety of factors that account for the low assignment of counterparty credit risks. One of these, mentioned earlier, is that the notional amount of swaps is never exchanged. Second, the overall credit quality of swap market participants is high, typically A-rated or better (Bomfim, 2003). Entities rated BBB or lower face significant resistance from participants in the swap market and are either banished or forced to adopt stricter credit enhancing mechanisms to assuage concerns about counterparty credit risks. The widespread use of master swap agreements has also helped to mitigate concerns about credit risks, providing mutually acceptable standards for the terms of each swap transaction entered into with a master swap agreement. The widespread practice of netting, discussed earlier, has also had significant influence. Tight bid-ask spreads,

¹⁵ E. Sorensen, and T. Bollier, “Pricing Swap Default Risk,” *Financial Analysts Journal*, May–June 1994.

generally much narrower than for corporate bonds, add to the allure of the interest-rate-swap market.

CONVERGENCE TRADING

In any market, there exist traders who believe that the markets have moved out of sync with fundamentals. This is one of the principal reasons why market prices tend to harbor mostly near levels that most would consider rational based on underlying fundamentals. The gravitation toward rationality also has considerable influence on policy makers, particularly central bankers, who must decide at times whether to counteract market forces and alter financial conditions.

In the interest-rate-swap market, plenty of trading occurs in anticipation of market movements that will drive swap spreads to a level consistent with the way participants perceive underlying fundamentals. Such *convergence trading* influences the behavior of swap spreads, helping to absorb shocks most times, but amplifying shocks that are unusually large.¹⁶ The message is that convergence trading has both stabilizing and destabilizing influence on the behavior of interest-rate-swap spreads. Kambhu (2006) arrives at his conclusion in part by using data from the repo market, where volume tends to be affected by swaps trading, which normally entails a transaction in the repo market. Kambhu notes that variation in repo volume stemming from swaps should be expected given the large size of the swap market. Figure 19.7 shows a typical convergence trade and its impact on markets.¹⁷

END USERS OF SWAPS

Swaps can prove useful to just about every class of borrower: sovereigns, supranationals, government agencies, banks and corporates (domestic and foreign), thrifts, insurance companies, real estate developers, and so on. One reason for the popularity of swaps with end users is that swaps are a non-zero-sum game and, as such, can have inherent value to all parties.

Another attraction of swaps is that they are a no-brainer. An entity condemned by the market to borrow at a floating rate could conceivably control

¹⁶ John Kambhu, "Trading Risk, Market Liquidity, and Convergence Trading in the Interest Rate Swap Spread," Federal Reserve Bank of New York, *Economic Policy Review*, May 2006.

¹⁷ Kambhu cites data from the Bank for International Settlements showing that in April 2004, the U.S. dollar interest-rate-swap market had daily trading volume with a notional value of \$195 billion.

FIGURE 19.7

Convergence trades and the change in the swap spread

Tables 1 and 2 below show the market impact of a convergence trade undertaken by a sufficiently large number of traders to affect market prices. The scenario depicted is that of a swap spread above its fundamental level, in which a trader expects the spread to fall back to that level. In this case, the convergence trade is a long swap position and a short Treasury position.

When the trader establishes the position (Table 1), the swap spread converges to its fundamental level; when the trader unwinds the position (Table 2), the swap spread diverges from its fundamental level—rising further above it.

Conversely, when the swap spread is below its fundamental level, the convergence trade position is the reverse of what we just described, and it has an opposite market impact on prices and rates.

Table 1
Establishing a Convergence Trade Position When the Swap Spread Is above Its Fundamental Level

	Position	Adding to Position	Market Price Impact	Interest Rate Change	Spread Change
Swap	Long	Buy ^a	Rise	Fall	Fall
Treasury	Short	Sell	Fall	Rise	

Table 2
Closing Out a Convergence Trade Position When the Swap Spread Is above Its Fundamental Level

	Position	Closing Out of Position	Market Price Impact	Interest Rate Change	Spread Change
Swap	Long	Sell ^a	Fall	Rise	Rise
Treasury	Short	Buy	Rise	Fall	

^a To buy a swap, as represented in Table 1, means to contract to receive the fixed rate in a new swap. In this instance, when more market participants than usual are seeking to receive the swap rate, the market impact is a downward pressure on the swap rate and a rise in the market-to-market value of outstanding swaps. The sale of a swap, as represented in Table 2, has the opposite effects of a buy.

much of its resulting rate risk through an adroit use of futures. However, an institution that uses futures to hedge rate risk needs a skilled trader, because a maladroit trader may get it into worse trouble than that which it sought to avoid through hedging; the unfortunate experiences that numerous institutions have had with futures hedges attest to this. A swap, in contrast to a futures hedge, takes no skill or tending on the part of the end user. He says, “I’d rather pay rate A than rate B,” signs an agreement, and that’s that. If he wants to pay a fixed rate so that he can budget interest expenses and sleep at night, all that is required is the stroke of a pen. If he has contracted to pay 10 and rates go to 30, he still pays 10. Of course, if rates go to zero, he still pays 10 too, but that is the nature of fixed-rate debt: it protects at a price.

SIZING UP THE SWAPS MARKET

Because it fills so many needs so well, the swap market has experienced unprecedented growth over the years. The Bank for International Settlements estimates that, at the end of 2005, the notional value of interest-rate derivatives contracts outstanding totaled \$215 trillion, which consisted of \$173 trillion in interest-rate swaps, \$28 trillion in over-the-counter options contracts, and \$14 trillion of forward rate agreements (Table 19.4). The maturities of these contracts as well as for forward rate agreements are shown in Table 19.5, and Table 19.6 shows the breakdown by currency. Table 19.7 shows the amount of over-the-counter (OTC) foreign-exchange derivatives outstanding by instrument, maturity, and counterparty. Table 19.8 shows the amount of foreign-exchange derivatives outstanding by currency. As an aside and as a supplement to our discussion of credit default swaps (CDSs) in Chapter 10, Table 19.9 shows the notional amount of CDSs outstanding.

SWAPPING SWAPS

A source of continued growth in the swap market is the tendency of financially sophisticated people to view a swap not as a once-and-for-all deal but rather as a deal that they are willing to reverse or to alter whenever their views on markets change and they consequently feel the need to fine-tune their assets, their liabilities, or both. Sovereigns, corporate treasurers, and others of this ilk are active *swappers of swaps*.

A corporation that has in the past done a swap that it now wants to unwind often has a profit in that swap. If the counterparty is willing, the

Text continues on page 919

TABLE 19.4

Amounts outstanding of over-the-counter (OTC) derivatives by risk category and instrument
(in billions of dollars)

Risk Category/ Instrument	Notional amounts					Gross market values				
	2003 December	2004 June	2004 December	2005 June	2005 December	2003 December	2004 June	2004 December	2005 June	2005 December
TOTAL CONTRACTS	197,167	220,058	251,499	271,282	284,819	6,987	6,395	9,244	10,417	9,139
Foreign-exchange contracts	24,475	26,997	29,289	31,081	31,609	1,301	867	1,546	1,141	998
Outright forwards and forex swaps	12,387	13,926	14,951	15,801	15,915	607	308	643	464	407
Currency swaps	6,371	7,033	8,223	8,236	8,501	557	442	745	549	452
Options	5,717	6,038	6,115	7,045	7,193	136	116	158	129	139
Interest rate contracts	141,991	164,626	190,502	204,795	215,237	4,328	3,951	5,417	6,699	5,463
Forward rate agreements	10,769	13,144	12,789	13,973	14,483	19	29	22	31	29
Interest-rate swaps	111,209	127,570	150,631	163,749	172,869	3,918	3,562	4,903	6,077	4,864
Options	20,012	23,912	27,082	27,072	27,885	391	360	492	592	570
Equity-linked contracts	3,787	4,521	4,385	4,551	5,057	274	294	498	382	560
Forwards and swaps	601	691	756	1,086	1,111	57	63	76	88	105
Options	3,186	3,829	3,629	3,464	3,946	217	231	422	294	455
Commodity contracts	1,406	1,270	1,443	2,940	3,608	128	166	169	376	523

Continued

TABLE 19.4—cont'd

Amounts outstanding of over-the-counter (OTC) derivatives by risk category and instrument
(in billions of dollars)

Risk Category/ Instrument	<i>Notional amounts</i>					<i>Gross market values</i>				
	2003 December	2004 June	2004 December	2005 June	2005 December	2003 December	2004 June	2004 December	2005 June	2005 December
Gold	344	318	369	288	334	39	45	32	24	51
Other commodities	1,062	952	1,074	2,652	3,273	88	121	137	351	472
Forwards and swaps	420	503	558	1,748	2,319	-	-	-	-	-
Options	642	449	516	904	955	-	-	-	-	-
Other	25,508	22,644	25,879	27,915	29,308	957	1,116	1,613	1,818	1,595
Memorandum item:										
GROSS CREDIT EXPOSURE	-	-	-	-	-	1,969	1,478	2,075	1,897	2,003

Source: Bank for International Settlements

TABLE 19.5

Notional amounts outstanding of OTC single-currency interest-rate derivatives by instrument, maturity, and counterparty (in billions of U.S. dollars)

Instrument/Maturity	<i>All counterparties</i>					<i>Reporting dealers</i>				
	2003 December	2004 June	2004 December	2005 June	2005 December	2003 December	2004 June	2004 December	2005 June	2005 December
TOTAL CONTRACTS	141,991	164,626	190,502	204,795	215,237	63,579	72,550	82,258	87,049	90,984
Maturity of 1 year or less	46,474	57,157	62,659	66,681	69,091	22,366	28,017	29,477	31,454	33,391
Maturity over 1 year and up to 5 years	58,914	66,093	77,929	82,341	88,402	26,250	28,623	33,171	34,530	35,962
Maturity over 5 years	36,603	41,376	49,915	55,773	57,744	14,962	15,910	19,609	21,065	21,631
Forwards and swaps	121,978	140,714	163,420	177,723	187,352	54,992	63,273	71,172	75,144	78,306
Maturity of 1 year or less	41,084	49,397	52,948	58,541	61,694	20,052	25,303	26,089	28,293	30,116
Maturity over 1 year and up to 5 years	49,866	56,042	67,031	71,218	75,896	22,329	24,566	28,367	29,532	30,350
Maturity over 5 years	31,028	35,275	43,441	47,964	49,762	12,611	13,404	16,716	17,318	17,840
Options	20,012	23,912	27,082	27,072	27,885	8,587	9,277	11,086	11,905	12,678
Maturity of 1 year or less	5,390	7,760	9,710	8,140	7,397	2,315	2,715	3,389	3,161	3,276
Maturity over 1 year and up to 5 years	9,048	10,052	10,898	11,123	12,506	3,921	4,057	4,804	4,997	5,612
Maturity over 5 years	5,574	6,101	6,474	7,809	7,982	2,352	2,506	2,893	3,747	3,791

TABLE 19.6

Amounts outstanding of OTC single-currency interest-rate derivatives by currency (in billions of U.S. dollars)

Currencies	<i>Notional amounts</i>					<i>Gross market values</i>				
	2003 December	2004 June	2004 December	2005 June	2005 December	2003 December	2004 June	2004 December	2005 June	2005 December
ALL CURRENCIES	141,991	164,626	190,502	204,795	215,237	4,328	3,951	5,417	6,699	5,463
Australian dollar	488	458	609	647	729	9	5	5	7	6
Canadian dollar	1,302	1,298	1,475	1,602	1,747	36	28	40	53	36
Danish krone	147	88	210	176	144	9	4	8	13	6
Euro	55,793	63,006	76,161	76,426	82,641	1,730	1,774	2,986	3,692	3,002
Hong Kong dollar	287	283	258	389	356	7	3	5	4	4
Japanese yen	19,526	21,103	24,209	25,224	26,561	358	324	352	454	301
New Zealand dollar	10	10	9	11	15	-	-	-	-	-
Norwegian krone	303	323	470	489	432	5	4	8	7	6
Pound sterling	9,884	11,867	15,289	16,621	15,248	228	188	240	372	346
Swedish krona	1,520	1,645	2,213	2,222	2,551	33	28	48	63	41
Swiss franc	2,444	2,651	3,243	2,804	3,283	73	48	62	75	49
U.S. dollar	46,178	57,827	61,103	72,558	75,354	1,734	1,464	1,535	1,826	1,535
Other	4,078	4,065	5,252	5,623	6,175	106	81	129	134	130

Source: Bank for International Settlements

TABLE 19.7

Notional amounts outstanding of OTC foreign-exchange derivatives by instrument, maturity, and counterparty (in billions of U.S. dollars)

Instrument/Maturity	<i>All counterparties</i>					<i>Reporting dealers</i>				
	2003 December	2004 June	2004 December	2005 June	2005 December	2003 December	2004 June	2004 December	2005 June	2005 December
TOTAL CONTRACTS	24,475	26,997	29,289	31,081	31,609	8,660	10,796	11,668	12,179	12,092
Maturity of 1 year or less	18,840	21,252	22,834	24,256	24,134	6,846	8,794	9,371	9,677	9,339
Maturity over 1 year and up to 5 years	3,901	3,912	4,386	4,729	5,180	1,253	1,372	1,585	1,737	1,922
Maturity over 5 years	1,734	1,834	2,069	2,097	2,295	561	631	712	765	832
Forwards and swaps	18,758	20,959	23,174	24,036	24,416	6,904	8,528	9,055	9,206	8,941
Maturity of 1 year or less	13,746	15,834	17,522	18,195	18,188	5,257	6,738	7,069	7,058	6,669
Maturity over 1 year and up to 5 years	3,356	3,383	3,676	3,847	4,055	1,103	1,181	1,303	1,418	1,484
Maturity over 5 years	1,656	1,743	1,976	1,994	2,172	544	609	684	730	788
Options	5,717	6,038	6,115	7,045	7,193	1,756	2,268	2,613	2,973	3,150
Maturity of 1 year or less	5,094	5,418	5,312	6,061	5,946	1,589	2,056	2,302	2,618	2,669
Maturity over 1 year and up to 5 years	545	529	710	882	1,124	150	191	282	319	438
Maturity over 5 years	78	91	93	102	123	17	21	29	35	43

Source: Bank for International Settlements

TABLE 19.8

Amounts outstanding of OTC foreign-exchange derivatives by currency (in billions of U.S. dollars)

Currencies	<i>Notional amounts</i>					<i>Gross market values</i>				
	2003 December	2004 June	2004 December	2005 June	2005 December	2003 December	2004 June	2004 December	2005 June	2005 December
ALL CURRENCIES	24,475	26,997	29,289	31,081	31,609	1,301	867	1,546	1,141	998
Australian dollar	817	943	1,092	1,236	1,500	51	42	54	39	41
Canadian dollar	1,019	968	1,171	1,217	1,380	58	35	71	56	70
Danish krone	26	33	119	125	136	1	1	5	3	2
Euro	10,145	10,312	11,900	12,404	12,870	665	380	752	512	397
Hong Kong dollar	580	591	605	556	496	6	3	5	4	3
Japanese yen	5,500	6,516	7,076	6,907	7,793	217	178	258	220	256
New Zealand dollar	8	10	14	15	24	-	-	-	2	-
Norwegian krone	110	88	140	135	134	7	2	7	4	3
Pound sterling	4,286	4,614	4,331	4,273	4,422	179	130	220	150	121
Swedish krona	821	767	957	1,039	1,071	36	18	41	48	23
Swiss franc	1,333	1,344	1,452	1,586	1,692	56	37	60	54	46
Thai baht	5	2	2	3	5	-	-	-	-	-
U.S. dollar	21,429	24,551	25,726	27,584	26,364	1,212	808	1,408	1,024	868
Other	2,873	3,253	3,994	5,082	5,332	113	99	210	168	165

Source: Bank for International Settlements

TABLE 19.9

Notional amounts of credit default swaps outstanding at the end of 2005 (in billions of U.S. dollars)

	Notional Amounts Outstanding Bought	Notional Amounts Outstanding Sold
Total CDS contracts	10,281,132	9,749,260
Reporting dealers	6,371,534	6,293,294
Other financial institutions	3,551,600	3,179,401
Banks and security firms	2,146,557	1,970,415
Insurance and financial guaranty firms	176,347	58,588
Other	1,228,696	1,150,398
Nonfinancial institutions	358,004	276,571
Maturity of 1 year or less	859,562	475,207
Maturity over 1 year and up to 5 years	7,161,880	7,246,823
Maturity over 5 years	2,259,689	2,027,231
Single-name instruments	7,491,087	7,312,403
Multiname instruments	2,790,045	2,436,857

Source: Bank for International Settlements

initial agreement can be torn up and a cash payment made reflecting the current market value of the swap. More often, a swap must be unwound via a *mirror swap*. For example, a corporation's position might be that it had swapped fixed to floating when fixed rates were 4 and that rates have risen to 4.5; in that case, if the corporation does a mirror swap, it will probably end up receiving at 4.5 and so realize its profit on its initial swap over the remaining life of that swap.

Whatever the future holds for swaps, it's a safe bet that life in swap-land will continue to be hectic and full of unexpected twists and turns—nary a dull moment.

REVIEW IN BRIEF

- An *interest-rate swap* is a contract between two parties to pay and receive, with a set frequency, interest payments determined by applying the differential between two interest rates.

- The swaps market has become humongous in size, surpassing by a wide margin the size of the global economy. At the end of 2005, the total notional value of interest-rate swaps outstanding was \$173 trillion.
- A *currency swap* is a contract between two parties exchanging two currencies, with the transaction to be unwound on an agreed-upon date.
- The first type of interest-rate swap done was a straight *coupon swap*, which enables borrowers with different comparative advantages to swap their debt obligations, with both parties benefiting from the swap via lower borrowing costs.
- A *plain vanilla swap* is a swap of fixed-rate for floating-rate dollars with a maturity ranging from 2 to 10 years.
- Payments of fixed-rate and floating-rate interest due under the swap are due on the same day and are *netted*, a practice that has become nearly universal.
- Today, most swaps are done using standard documentation called *master agreements*, which cover virtually every aspect of a swap transaction. The most popular agreement is the ISDA's master agreement, which was last revised in 2002.
- There are many *exotic swaps*, the *collapsible swap* and the *quanto swap*, for example.
- Dealers have been accounting for a smaller portion of swaps volume in recent years, with the dealer share of trading volume in interest-rate derivatives falling to just under 50% in 2004.
- To *sell* a swap, be the receiver of fixed, is equivalent to being *long* a bond. Consequently, if interest rates *rise (fall)*, the market value of the swap will *fall (rise)*.
- The *IMM swap* is a swap of a 1-year fixed rate against 3-month LIBOR, where the 3-month rate floats.
- A swap is a strip of FRAs, and a FRA is a single-set swap (except for differences in settlement features).
- A *swaption* is an option on a swap that gives the buyer the option to enter into a swap agreement at a specified date in the future.
- A yield curve can be drawn for swaps, that is, independent of the Treasury yield curve, using either market-based rates or synthetic rates taken from Eurodollar contracts. Many use the swap rate

curve as a benchmark. The swap rate curve shows strong correlation to the Treasury curve, with a few notable differences.

- A major factor in the growth of the interest-rate-swap market has been the low degree of counterparty risk assigned by participants in the swap market. Key reasons that counterparty risks are perceived to be low include the high credit quality of most swap market participants, netting practices, and master agreements.
- Convergence trading in the swap market has been found to influence swap spreads, acting as both a stabilizing and destabilizing force.

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Certificates of Deposit

The first domestic negotiable certificates of deposit (CDs) backed with a dealer commitment to make a secondary market in them were issued in 1961 by Citibank. Throughout the 1970s and early 1980s, short-term, fixed-rate CDs became a major money market instrument; in their funding, money market banks came to rely so heavily on the sale of such paper that it became impossible to imagine how these banks could manage their liability positions without them.

Over time, the market for short-term, fixed-rate CDs became moribund. The abrupt change was the result of several factors: credit problems at a number of major banks and the nation's savings and loan institutions, rate deregulation, changes in reserve requirements, the shift of money center banks toward investment banking, and the emergence of other, more attractive modes of bank financing.

Today, the CD market has been enlivened a bit at the institutional level thanks to a surge in corporate profits, which has made more money available for investment, and because of increased flexibility in CD ownership. Following a period of contraction from 1989 to 1995, the total amount of institutional CDs outstanding (those over \$100,000) has increased sharply, from \$316 billion at the start of 1995 to \$1.403 trillion in early 2006. When small time deposits are included, the tally jumps to almost \$2.5 trillion.

This chapter thus serves three purposes: it describes briefly the market for old-style CDs; it tells of innovations in the CD market; and it serves as a preface to Chapter 24's discussion of medium-term notes (MTNs), a major subclass made up of bank deposit notes.

FIGURE 20.1

A specimen CD

 CONTINENTAL BANK CONTINENTAL BANK NATIONAL BANK AND TRUST COMPANY OF CHICAGO 233 SOUTH LA SALLE STREET CHICAGO ILLINOIS 60603		NEGOTIABLE TIME CERTIFICATE OF DEPOSIT BC 000015	
		CHICAGO _____ #1	
THERE HAS BEEN DEPOSITED IN THIS BANK THE SUM OF \$ _____			
PAYABLE TO THE ORDER OF _____		DOLLARS	
ON _____ WITH INTEREST FROM THE DATE HEREOF UNTIL MATURITY AT THE RATE OF _____ PERCENT PER ANNUM			
CANCELLED			
INTEREST COMPUTED ON ACTUAL NUMBER OF DAYS ON 360 DAY BASIS NO INTEREST WILL BE PAID ON THE DEPOSIT AFTER MATURITY DATE.			
AUTHORIZED SIGNATURE _____			
⑆000015⑆ ⑆0710-0003⑆ 47-02379⑆			

THE INSTRUMENT

Banks have long needed some dependable source of longer-term funds (maturities measured in months, not days) to maintain their liquidity and to manage their interest-rate exposure. Most money center banks have always received some large time deposits from individuals, partnerships, and smaller corporations.

The total of such deposits was, however, small relative to the banks' needs for longer-term deposits. To fill the resulting gap, the banks turned to the one sector of the money market in which they could buy longer-term funds in volume, the CD market. At the end of 2002, commercial banks were funding 12.7% of their assets with jumbo CDs.¹

A certificate of deposit is a negotiable instrument evidencing a time deposit made with a bank at a fixed rate of interest for a fixed period (Figure 20.1). CDs bear interest and are quoted on an interest-bearing rather than a discount basis. Normally, interest on a CD, which is calculated for actual days on a 360-day-year basis, is paid at maturity. However, on CDs issued with a maturity beyond one year, interest is paid semiannually.

CDs are normally issued in \$1 million pieces. While technically negotiable, smaller pieces have poor marketability and have always traded

¹ R. Alton Gilbert, Andrew P. Meyer, and Mark D. Vaughn, "Can Feedback from the Jumbo CD Market Improve Bank Surveillance?" Federal Reserve Bank of Richmond, *Economic Quarterly*, Spring 2006.

at a concession to the market. A large portion of CDs, regardless of the issuer's location, is payable in New York.

Whereas CDs were once issued in a relatively straightforward manner with very few toggles and switches, today CDs are available in many new shapes and forms. For example, CDs are now more readily transferable from one financial institution to another thanks to *brokered CDs*. In addition, a greater number of CDs have a variable rate instead of a fixed rate. We discuss these topics in greater detail later in this chapter.

When first issued, CDs were subject to a rate lid under the Fed's Regulation (Reg) Q. In 1969, this lid became binding as money market rates pushed through the Reg Q ceiling. As a result, money moved from domestic time deposits into Eurodeposits, and U.S. banks lost \$14 billion of CD money. In response, they promptly borrowed the \$14 billion back from the Euromarket; the Fed's ill-conceived attempt to limit bank lending by cutting off the bank's access to bought money failed. After 1973, the Fed imposed no lid on the rate that banks might pay on time deposits of \$100,000 or more. In the final heydays of the early domestic CD market (the early 1980s), New York City banks were borrowing about \$35 billion in this market; all large U.S. banks, about \$135 billion. (The Federal Reserve stopped releasing data on negotiable, large-denomination CDs in 1987.)

Variable-Rate CDs

In the late 1970s, largely in response to demand from dealers who sold CDs to money funds, banks began to sell a new type of negotiable CD, *variable-rate CD (VRCD)*, also known today as a *variable-coupon CD*, or a *floating-rate CD*. The two most prevalent types were 6-month CDs with a 30-day *roll* (on each roll date, accrued interest was paid and a new coupon was set), and 1-year CDs with a 3-month roll.

The coupon established on a variable-rate CD at issue and on subsequent roll dates was set at some amount (12.5 to 30 bp depending on the name of the issuer and the maturity) above the average rate, as indicated by the *composite* rate published by the Fed, that banks were paying on new CDs with an original maturity equal to the length of the roll period. In more recent years, the interest rate on each leg of the VRCD is set at some fixed spread to a particular base rate, which is usually a composite secondary market CD rate, a T-bill rate, London Interbank Offered Rate (LIBOR), the prime rate, or some other variable rate.

The major buyers of variable-rate CDs in the early days were money market funds. In calculating the average maturity of their portfolios, these funds treated variable-rate CDs as if they matured on their next roll date. One reason was that such paper must trade at or above par on a roll date. Second, and more important, the dealer selling the CD gave the buyer a *put* (the right to put the paper back to her), sometimes known as a *put letter*; the buyer could exercise this put on each roll date.

Variable-rate CDs represented about 10% of outstanding large CDs during the 1980s. That number had shrunk to only about 2% of outstanding large CDs by the early 1990s, when interest-rate levels had begun to decline and investors were no longer seeking the inflation protection they once did.² In addition, the weak banking system evident in the savings and loan crisis at that time probably turned some investors away from bank products.

Discount CDs

Negotiable discount CDs are issued at a discount to their final maturity value, just like T-bills. They are issued mostly by large money center banks directly to their customers with terms of as long as five years, but usually between one and six months. Other banks and thrifts will normally turn to the CD brokers to sell theirs. The minimum denomination for discount CDs is \$100,000; as with T-bills, a round lot in the secondary market for discount CDs is \$5 million.

Volume

After the removal of Reg Q on CDs, changes in the volume of outstanding CDs occurred largely in response to variations in the level of loan demand experienced by banks. This was to be expected, since banks viewed CD money as a *marginal source of funds* to be drawn upon when an increase in loans had to be funded.

Another factor influencing the volume of CDs outstanding was the need that issuing banks felt to have a continuing presence in the market. For regional and foreign banks, the need to be in the market on an ongoing basis was especially acute, since these banks had to keep selling to establish and maintain their names on investors' approved lists.

² Timothy Q. Cook and Robert K. Laroche (eds.), *Instruments of the Money Market*, 7th ed., Federal Reserve Bank of Richmond, 1993.

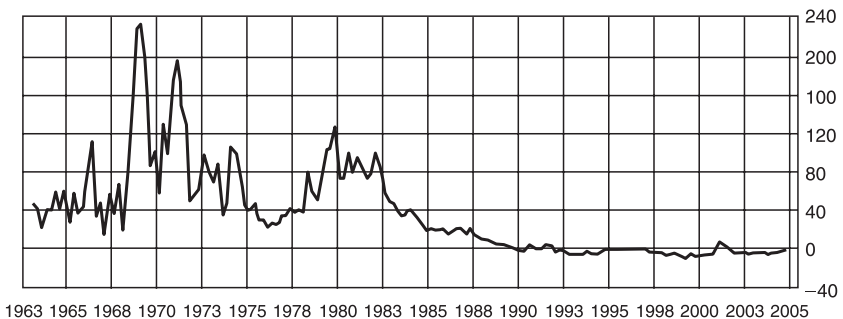
Yield Spreads on CDs

Because FDIC insurance offers a depositor protection on only the first \$100,000 of deposits with a bank, this insurance is meaningless for corporate and other large depositors. Thus, the investor who puts one or many millions into bank CDs assumes some small credit risk. For this reason, and also because of their lesser liquidity, CDs have always yielded somewhat more than bills of the same maturity, with the spread becoming, in recent years, a bit wider and somewhat more variable owing to large changes in the federal funds rate imposed by the Federal Reserve following its steep rate cuts, during the period 2001–2003, and rate hikes during the period 2004–2006 (Figure 20.2). Today, 3-month domestic CDs really trade at a spread off (below) 3-month LIBOR. The spread averaged just 5 basis points between 2003 and 2006 (Figure 20.3).

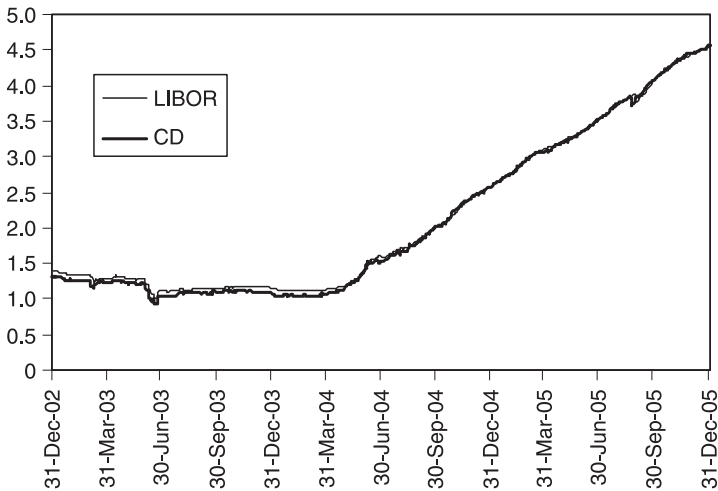
The yield spread between CDs and bills widens when money tightens for the following reasons. First, there is the familiar, if irrational, tendency of investors to back away when money market rates rise, from risks, that, when rates were low, they willingly assumed to raise return on their investments. In other words, credit spreads have a tendency to widen across the fixed-income universe when the Fed raises interest rates. Second, the condition of the banking system is perceived to be worse off when the Fed raises interest rates, partly because the rate hikes tend to cause net interest

FIGURE 20.2

Spread between LIBID and U.S. certificates of deposit, 3-month rates, in basis points



Source: Bank for International Settlements

FIGURE 20.3**3-month CD rates closely track 3-month LIBOR**

Source: British Bankers Association, Federal Reserve

margins to shrink and also because investors expect the hike to eventually put strain on the banking system because of economic effects; thus, the risks associated, in the eyes of many investors, with holding bank CDs tend to be positively correlated with the rates yielded by such instruments. A third reason why yield spreads tend to widen when the Fed raises interest rates is that CDs are far less liquid instruments than actively traded issues such as bills.

Data from the Federal Reserve show that during the period 1960–2006, the yield spread between 3-month CDs and 3-month bills was as wide as 470 basis points in 1974 owing to prominent bank failures (West Germany’s Bankhaus Herstatt in June 1974 and Franklin National Bank in October 1974); close to 200 basis points following the stock market crash of 1987; and around 100 basis points in 1990 during the savings and loan crisis. More recent examples show that the possibility continues to exist for sharp changes in the yield spread. For example, during the Asian financial crisis of 1998 and following Russia’s default, the spread between 3-month CDs and 3-month bills widened to 153 basis points. The spread was also as wide as 100 basis points in 2000 when the stock market bubble was bursting.

FDIC Coverage

The FDIC insures deposits in banks via the Bank Insurance Fund (BIF), and it insures deposits kept in savings and loan institutions via the Savings Association Insurance Fund (SAIF). Legislation was passed in 2003 by both the U.S. House of Representatives and the U.S. Senate to merge these two funds, but the bills were not passed by the respective chambers because of disagreements over other issues. Both of the funds are backed by the full faith and credit of the United States.

Deposits are insured up to \$100,000 at every institution in which a person or entity is the legal owner of funds. For example, an individual is insured up to \$100,000 for a deposit she holds at XYZ bank, and for up to \$100,000 for deposits held at other banks. In addition, if the individual is married and has a joint account with her husband at XYZ bank, she and her husband would be insured for up to \$100,000 each for the joint account, even if each of them has another \$100,000 of insured coverage in other accounts. In other words, in the case of a married couple, it is possible for each individual to have deposits insured to \$300,000 (\$100,000 for the individual account and \$200,000 for the joint account, assuming it is registered in a joint tenancy with rights of survivorship).

Brokerage CDs are usually insured by the BIF and SAIF, and similar coverage is given for credit union share certificate holders through the National Credit Union Administration (NCUA), which administers the National Credit Union Share Insurance Fund (NCUSIF).

These coverage amounts are too low, of course, for the institutional investor, which is why credit-related issues are an important factor in the decision to own CDs, especially brokered ones.

Importantly, for the first time in more than 25 years, Congress has raised the limit on the federal deposit insurance coverage that protects retirement savings, effective April 1, 2006. The new law provides for up to \$250,000 of deposit insurance for retirement accounts—the combined total of the traditional and Roth IRAs (individual retirement accounts), self-directed Keoghs, and certain other retirement accounts an individual may have on deposit at an FDIC-insured bank or savings institution.

In addition the new FDIC insurance coverage for self-directed retirement accounts applies primarily to CDs. These accounts also are insured for up to \$250,000 separately from any other deposits an individual may have at the same institution.

Investors in Bank CDs

When CDs were first issued, a lot of them were bought by cash-rich corporations. During the 1980s, however, many corporations went from being cash-rich to being big borrowers of short-term money. Soon, over half of bank CDs were being bought by money funds.

Generally, banks do not invest actively in CDs other than when they position them as part of their dealer operations. In this respect, it should be noted that a bank may not invest in or buy back one of its own CDs because the Fed would view this as a violation of the condition that legally permits the bank to issue the instrument, namely, the receipt of a fixed-maturity time deposit.³

Today, the ownership of CDs is widespread. Households were of course the largest holders of the roughly \$1 trillion of small time deposits outstanding at the beginning of 2006. Nonfinancial businesses are the largest holders of institutional CDs, accounting for about half the total outstanding. The nonfinancial holdings are split between corporations and nonfarm, noncorporate businesses, which include partnerships, not-for-profit entities, and so forth. Foreign investors held about 16% of outstandings in early 2006; money market mutual funds held about 12%, about the same as state and local governments; pension funds had about 10%. Smaller holdings were held by government-sponsored enterprises (3%), and credit unions (<2%). Interestingly, foreign investors increased their holdings of CDs by about 30% in the first half of 2006, a period when interest rates were rising. This shows the responsiveness of the foreign investor to changes in the U.S. rate environment.

Because CDs expose the holder to a credit risk, large investors in CDs seek to assess the creditworthiness of different banks. On the basis of such assessments, each investor establishes a list of banks whose paper she is willing to buy and sets limits, *undisclosed lines* in Street jargon, on the amount she will place with individual banks on her approved list. The strong condition of the U.S. banking system during the early 2000s has broadened the number of banks that investors will do business with.

³ A few money market banks have traded their own paper in their role as *dealers* in CDs. The Fed has never challenged their doing so. No one wants to open the issue because it would get the banks and the Fed back to discussing whether a CD is a security or a deposit; and reopening that discussion would again raise the question of state blue-sky laws and other issues that were considered years ago when Citi began issuing *negotiable* CDs.

Nevertheless, the analysis investors put into deciding which banks investors will invest with and in what amounts can range from casual to elaborate. At the elaborate end are investors who pour over the reams of detailed information on the financial conditions of individual banks that is provided in publications disseminated by bank analysts. Not surprisingly, the sale of such publications has increased dramatically in past years after one major bank had a serious problem.

While many investors worry about the possibility that a major bank issuing CDs might some day encounter difficulties, others, including some of the most sophisticated, completely discount that possibility, arguing that the Federal Reserve would not let one of them fail so long as they play ball. They reason that a bank that doesn't play ball may end up closing or being merged with another bank, but depositors are not going to lose money. Moreover, if a large bank were to fail, conditions would be such that other worries would preempt investors' concerns over lost CD dollars. This reasoning is faulty to the extent that no such implicit guarantee is written into law and that the Federal Reserve's goal in such an instance is to counter system risks that arise, not the bailout of depositors.

To such investors, the main reason for tracking the problems of individual banks closely is that other investors' reactions to these problems create market premiums and discounts, which in turn create opportunities for investors.

Tiering

Tiering, which is the variation in CD rates between banks that can be attributed to perceived differences in credit risk, has existed in the CD market for decades, with investors finding varying reasons to assign either more or less risk to different banks. We showed this earlier in our mention of the long-term history of yield spreads between CDs and bills and in Figure 20.2.

During a few episodes over the past few decades, investors have looked more closely than at other times at the condition of individual banks issuing CDs, and tiering has become a pronounced condition. Who had to pay up changed constantly as investors' perceptions of the financial strengths and weaknesses of individual banks changed. When New York City appeared to be on the verge of bankruptcy in the 1970s, the top New York banks, all of which had substantial holdings of New York City securities, had to pay higher rates than top Chicago banks to issue CDs. Several years later the situation reversed.

As suggested in Figure 20.2, there have been a few periods that have been particularly hard on regional banks. During such times, many CD investors reacted to the troubled state of the banking industry by paring regional banks from their lists of acceptable names. This forced some regional banks out of weaker markets and caused others to have to pay up. Later, as money eased, customers began looking at a wider range of names and found that some regional banks were strong credits compared with some of their better known competitors in other regions; and gradually, more regional names became acceptable to investors in the national market.

The tiering that developed in these various episodes among CDs issued by top banks has always gradually worked itself off, sometimes fairly quickly when the stress causing it has worn off. Such was the case in 1998 when Russia's default caused a relatively brief surge in demand for liquidity. As this occurred, management in certain top banks came to the dealers and reminded them that their banks provided the dealers with financing and other business. They then added that they saw no reason why their CDs should not trade as well as those of any of the other top 10 banks. The dealers said, "OK, we'll trade the top 10 names on a no-names basis." This meant that a dealer's bid or offer to another dealer would be good for any of the top (by asset size) 10 banks.

Initially, this change tended to improve trading in domestic CDs. Making heterogeneous paper more nearly homogeneous increased the ease with which CDs could be traded, and that in turn increased the attractiveness of CDs as a trading vehicle and, thereby, liquidity in the CD market.

However, no dealer agreement—written or, in this case, understood—could make paper trade for long at a level other than that at which the forces of supply and demand determined it should trade. The extraordinary events of 1982 clearly demonstrated this; when both Chase and Contil experienced severe, well-publicized difficulties, no dealer or sophisticated investor thought either bank was in danger of failing. Nonetheless, suddenly a lot of investors did not want to touch either Chase or Contil paper. They feared that the paper of both banks would become less liquid. Also, a corporate portfolio manager might want to get out of such paper to avoid having to defend her holding it to her board.

Maturities

Most CDs issued in the United States were once in the 1- to 3-month area. There was a market in 6-month paper, but beyond that, no issuing was

done in real size. There were several reasons for this. One was demand. Money funds (see Chapter 26) are required to maintain a short average maturity on the securities they hold. Many other investors buying CDs were corporations funding tax and dividend dates that were at most 90 days in the future. Such investors needed liquidity, and many preferred to obtain it by buying short paper that they could hold to maturity.

A second reason for the thin market in CDs with a maturity at issue of six months or more is that, in normal times when the yield curve is upward sloping, it's cheaper for banks to buy longer-term money by rolling 3-month CDs. "Six-month money is high-cost money," noted one banker. "So you have to believe that the Fed is going to move dramatically to justify buying it on rate considerations alone. If you buy it at all, it's likely to be to improve—at an acknowledged cost—your liquidity."

Today, maturities can range anywhere from seven days to more than five years, although most tend to be denominated in numbers of months, such as 1-, 3-, 6-, and 12-month maturities. In some banks, in their efforts to increase the flexibility of CDs, which for years have been known for anything but their flexibility, investors are allowed to customize the maturity of their CD for whatever reason.

For longer-dated CDs with maturities beyond 12 months, some banks have added a call feature allowing them to terminate, or call the CD, before its maturity. This feature is usually added to long-term, high-yield CDs. Banks will tend to call these CDs when interest rates fall because they can reissue the CDs at a lower rate. Some unsuspecting investors have bought CDs believing that they would mature after 12 months only to find out that they'd been snookered by ads that placed emphasis on the fact that the CDs were not callable for the first 12 months, often in boldface saying either "one-year callable" or "one-year noncallable," fooling investors into believing that the CDs would mature after a year even though their maturity date was years into the future.

The All-In Cost of CD Money

When a bank evaluates the cost of CD money, it thinks in terms not of the rate it posts, but of its *all-in* cost—reserve requirements and FDIC insurance included. The Fed used to be concerned with the short average maturity of bank CDs outstanding. To induce banks to issue long-term CDs, the Fed first raised Reg Q ceilings on CDs of longer maturity and then cut reserve requirements on them. However, when money tightened and interest rates

rose—precisely the time when the Fed wanted to see banks buy longer-term money—the average maturity of CDs outstanding declined. During such times, the banks wanted to issue longer-term CDs, but as a practical matter, investors refused to buy them. The Fed's old structure of reserve requirements—lower requirements on longer CDs—probably had little impact on CD maturities because it was outweighed by the impact of investors' preferences with respect to maturities.

Today, the Fed reserve requirement on bank sales of short-term CDs is 3% (for nonpersonal time deposits the requirement is zero). The impact of this on the all-in cost to a bank of money raised via the sale of short-term CDs is easy to calculate. For such a bank, the all-in cost of CD money is 1.0309 times (103.09% of) its posted rate *plus*, of course, 23 bp (the rate for most banks) for FDIC insurance.⁴ To illustrate, if a bank is posting a rate of 4.0% on 3-month CDs, its all-in cost on that money (including the FDIC premium) will be:

$$\begin{aligned}(1.0309 \times 4.0) + 0.23 &= 4.1236 + 0.23 \\ &= 4.3536\end{aligned}$$

The New Issue Market

In the heyday of the CD market, banks preferred to place as much of their CDs as possible directly with customers through their own sales forces.

⁴ Calculating the all-in cost of CD money to a bank that must hold non-interest-bearing reserves at the Fed is simple. Let

r = the quoted rate paid on the CD

r^* = the all-in rate paid when required reserves are taken into account

If a bank must keep 3% reserves against time deposits, then the amount of money available to it will be, per dollar taken in, only \$1.00 – \$0.03; and the all-in cost of this money will be r^* in the expression

$$r^*(1.00 - 0.03) = r$$

which simplifies to

$$r^* = \frac{r}{0.97} = 1.0309r$$

A bank felt that the less visible borrowing it did through dealers, the better its credit would appear. Also, a bank feared that the CDs it issued through dealers might end up back on the Street just at the time it wanted to borrow additional funds, thereby creating a situation in which it had to compete with itself to write new CDs.

Despite their predilection for writing directly to customers, banks did issue a lot of CDs through dealers. As a funding officer whose attitude was typical noted, “All things being equal, we would rather place the deposit ourselves. But if a dealer is willing to take our CDs at a competitive rate and it fits our needs, we sell to them.” Often, a dealer got a few basis points for distributing a bank’s CDs, especially if the bank was trying to do a big program.

Over time, banks came to rely less on dealers to distribute their CDs. Banks expanded their own money market sales forces. Also, money funds started coming directly to banks. Said one bank officer, “Every time we post a rate, the money funds are the first buyers we see. Much of that money comes direct because the funds figure that the dealer, if he does the trade, will have his profit, whereas if they [the fund] come direct, they can get the full rate.”

Brokered CDs

A *brokered CD* is a CD that is issued by a bank but sold through a broker-dealer. The CD is usually held at the broker’s bank, not the investor’s bank except when they both coincidentally have accounts at the same bank (always possible and important to the investor from the standpoint of FDIC insurance). There are a number of distinct advantages to brokered CDs for both issuers and investors. For issuers, a brokered CD is yet another way to attract deposits. In addition, in most cases the CD will be kept outside the bank, which reduces some of the administrative burden associated with the CD. For investors, a brokered CD can be sold in the secondary market, and it can be transferred from one brokerage firm to another. This means that investors can liquidate their CDs without incurring early withdrawal penalties. The caveat to this, however, is that, if interest rates rise, the value of the CD will decline. The offset to this is that brokered CDs will tend to yield more than other CDs. Another advantage is that an investor needn’t open an account with the issuing bank in order to purchase one of its CDs, which, by the way, could well be yielding more than what the investor might have earned at his or her own bank.

An entity needn't be licensed or certified to broker CDs, and there are no state or federal agency licenses or examinations required either. This makes it easy for anyone to become a CD broker. And this makes it imperative for investors to look closely at brokers they are considering using to buy a CD. In particular, investors are advised by banking regulators to always check whether the CD broker has a history of complaints or fraud. Investors can do this by calling their state securities regulator or by checking with the National Association of Securities Dealers' Central Registration Depository.

YANKEE CDs

Foreign banks open branches in the United States, the natural home of the dollar, to expand their liability base in dollars for several reasons: to finance loans made to U.S. and foreign corporations operating in the United States, to finance other dollar-denominated paper they acquire, and to be able to arbitrage between the U.S. and Eurodollar markets.

Foreign banks that make a reasonable attempt to cultivate relationships with domestic banks can easily gain access to money in the fed funds market. However, since this market deals primarily in overnight funds, foreign banks wanting to obtain financing for longer periods had to rely on the sale in the New York market of their CDs, dubbed *Yankee CDs*. At the end of 2005, foreign banking offices operating in the United States had nearly \$500 billion of large time deposits outstanding.

While dealers can be helpful to U.S. banks in writing CDs, particularly second-tier banks, they were once a necessity to U.S. branches of foreign banks. A foreign bank branch trying to sell CDs in the U.S. market faced several problems. To many investors, its name was not well known. Second, even investors who had heard of a particular foreign bank often failed to perceive that, say, Barclays or Credit Lyonnais was a giant on the world banking scene just as was Citibank or Bank of America. Third, many sophisticated investors felt that they didn't know enough about foreign accounting practices to read intelligently the financial statements of foreign banks.

In issuing CDs in the United States, a foreign bank branch started with a few U.S. commercial customers who, because they had dealt with that bank abroad, knew it and were willing to buy its CDs. To sell beyond this limited customer base, a foreign bank branch had to turn to a dealer who, for a few basis points, would push that bank's paper by acquainting other investors with its name and credit. The resulting education took time, so a foreign

bank branch normally started out having to pay substantially more than a domestic issuer, a condition that gradually diminished as its name became accepted.

Lack of familiarity with foreign names is not the only problem foreign banks faced in selling their paper in the United States. For one, there is a practical limit set by most investors on how many of their dollars they are willing to put in the bank of another country. In addition, foreign banks that issue commercial paper through U.S. holding companies are competing with the bank's CDs for an investor's limit on the bank's name. These obstacles are important ones, and they probably reduce the amount of money that U.S. investors put into Yankee CDs, but with a half-trillion of Yankee CDs outstanding, the impact looks small.

EURODOLLAR CDs

Eurodollar CDs were first issued in the London market in 1966 by Citibank. The new instrument was quickly and readily accepted by the market, and volume outstanding rose rapidly. There were many factors that helped fuel the growth of the Eurodollar CD market, including the increased movement of capital across borders, attractive yield spreads, and, in recent years, a surge in dollar holdings abroad.

Characteristics and Rates

A Eurodollar CD, like a domestic CD, is a negotiable instrument evidencing a time deposit made with a bank at a fixed rate for a fixed period. Eurodollar CDs bear interest, and Eurodollar CD rates are quoted on an interest-bearing basis. Interest, which is calculated for actual days on a 360-day-year basis, is paid at maturity on Eurodollar CDs with an original maturity of one year or less, and annually on those with an original maturity of more than one year.

To all intents and purposes, the market in Eurodollar CDs is a London market. Eurodollar CDs are issued in centers outside London, but their numbers are smaller, and the liquidity and marketability of non-London CDs is somewhat limited.

Eurodollar CDs, like domestic CDs, are normally issued in \$1 million pieces, and round lots are \$5 million. Eurodollar CDs for less than these amounts have always traded at less of a concession to the market than have domestic CDs of similar size. Because most euro loans are rolled every three or six months, the bulk of Eurodollar CDs issued are in the 3- to 6-month

maturity range. However, Eurodollar CDs with maturities of five years or longer are common; the proceeds of such term CDs might be used to match fund an asset of similar maturity or to do one leg of an arbitrage.

The major issuers of Eurodollar CDs used to be the branches of all of the top U.S. banks. Other issuers were the British clearing banks, the British overseas banks, and London branches of Canadian, continental, Japanese, and regional U.S. banks.

Today, many of the top American banks still issue in the market, and there are also some regional banks that have tapped the Eurodollar CD market for funds. Since no reserve requirement applies to Eurodollar CDs issued by U.S. banks, U.S. banks are not deterred from issuing short-term Eurodollar CDs. Since 1997, FDIC insurance premiums on most large bank deposits in the United States have not had to pay any insurance premiums, thanks to new rules which eliminated insurance premiums for the best capitalized banks. In fact, over 90% of the banking industry paid no FDIC insurance premiums in the early 2000s. In the absence of reserve requirements and insurance premiums, the incentive to place money abroad has shrunk, as has the yield premium that Eurodollar CDs once offered.

The Investors

There has always been a chunk of the money invested in Eurodollar CDs that comes from banks in the expatriate money belt of Switzerland: Geneva, Lausanne, and Lugarno. The money invested is customer money, and the Eurodollar CDs acquired are less frequently traded because the customers for whom Swiss banks invest are interested in avoiding taxes and in obtaining safety, not in earning 16ths and 8ths through trading. Sometimes, such a customer needs cash; if so, the Swiss bank simply makes her a loan against her CD rather than sell the instrument.

Overall, today, the Eurodollar CD market is driven by the same investors who buy domestic CDs. The sharp increase in dollar holdings in recent years has broadened the ownership of Eurodollar CDs even further to include similar entities throughout the world.

With time, the concerns about the sovereign risk attached to London CDs and about funny, unfamiliar foreign names that once deterred conservative U.S. investors from buying Eurodollar CDs, especially ones issued by non-U.S. banks, have diminished considerably. Today, investing in foreign securities is more familiar to Americans. If Smith can buy imported products, she is unlikely to get upset if she finds that her money fund is holding

Eurodollar CDs. Smith may not know much about foreign banks, but at least she's surer than she used to be that it's not a troubled institution. It's not surprising, then, that U.S. investors held more than \$400 billion of Eurodollar deposits in early 2006 (depository institutions are excluded from this figure).

Factors Pushing Dollars Abroad

There are many reasons why investors both in the United States and abroad might decide to keep their dollars invested outside the United States, and this has helped fuel the growth of the Eurodollar market.

Political Considerations

In the early 2000s, surging oil prices boosted oil revenues in a number of oil-exporting nations. Interestingly, however, many beneficiaries of the increased oil revenues did not boost their holdings of dollar-denominated assets, despite the fact that their oil revenues were denominated in dollars. Indeed, Treasury holdings by OPEC-member countries increased by only \$4.7 billion in 2005, a trivial amount compared to the surge in oil revenues. It can be argued that the relatively small increase might reflect political considerations, with some OPEC-member countries facing pressures against investing in the United States while the United States was engaged in military battles in the region. Similar tensions were seen two decades earlier when the Soviet Union was investing amounts only in the tens of millions of dollars in the United States despite having tens of billions of dollars in reserve assets.

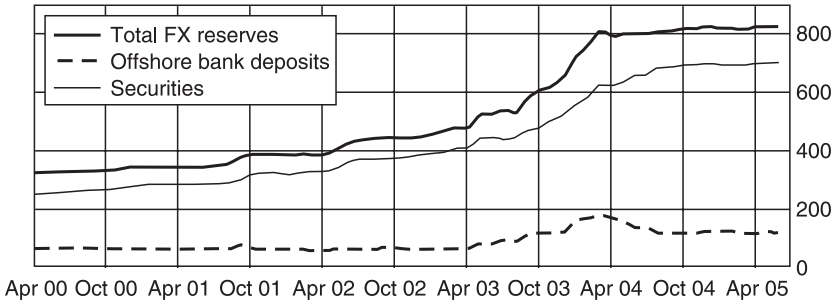
Litigation Risks

The Bank for International Settlements recently identified only a few countries that might choose to avoid investing in the United States for fear that litigation might put assets from those countries at risk of being seized. Argentina was one of those countries facing ongoing litigation risks following past defaults on its debts. Countries in such a predicament have to worry about the possibility of litigation arising from investors' attempts to buy sovereign debt at low prices in hopes of litigating their way into a seizure of the sovereign assets.⁵

⁵ Robert McCauley, "Distinguishing Global Dollar Reserves from Official Holdings in the United States," *BIS Quarterly Review*, September 2005.

FIGURE 20.4

In 2003–2004, offshore deposits surged and were invested with a lag in Japanese foreign exchange reserves, securities holdings, and offshore bank deposits (in billions of U.S. dollars)



Source: Japanese Ministry of Finance, Bank for International Settlements

Discovery Process

There have been times when rapid accumulations of dollars did not translate immediately into concomitant increases in holdings of domestic assets. One glaring example is the rapid accumulation of dollar reserves that Japan saw from 2003 to 2004. During this period, Japan was intervening heavily in the foreign exchange market, buying dollars in exchange for yen, in an effort to protect its export sector from the negative effects of the weakening of the value of the U.S. dollar. Initially, the intervention caused a spike in offshore bank deposits, but the funds were eventually withdrawn to purchase securities (Figure 20.4). When countries face rapid influxes of dollars, for a variety of reasons they may delay investing those assets. Reasons could include considerations for the optimal timing of new investments and preferences for newly issued securities.⁶

REVIEW IN BRIEF

- A certificate of deposit is a negotiable instrument representative of a time deposit made with a bank at a fixed rate of interest for a fixed period.

⁶ Ibid., p. 12.

- Today, the CD market has been enlivened a bit at the institutional level thanks to a surge in corporate profits, which have made more money available for investment, and thanks to increased flexibility in CD ownership.
- Whereas CDs were once issued in a relatively straightforward manner with very few toggles and switches, today CDs are available in many shapes and forms. There are variable-rate CDs, equity-linked CDs, discount CDs, and inflation-linked CDs, among other innovations.
- When small time deposits are included, the total amount of domestic CDs outstanding in the United States amounted to almost \$2.5 trillion in early 2006.
- Yields on CDs are higher than for T-bills, and spreads tend to widen in times of economic weakness or when other forms of stress occur. CD yields tend to stay within a few basis points of LIBOR.
- Brokered CDs enable investors to have a greater selection of CDs and the opportunity to sell their CDs before maturity. There are risks, though, with respect to insurance coverage (for individuals, especially), credit quality, market fluctuations, and, sometimes, misleading advertising.
- A Eurodollar CD, like a domestic CD, is a negotiable instrument representative of a time deposit made with a bank at a fixed rate for a fixed period.

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Bankers' Acceptances

The market for bankers' acceptances peaked in 1984 when there were around \$80 billion of acceptances outstanding, but the tally stood at just \$4 billion in the middle of 2006. Despite the decrease, the tale of this once substantial market still intrigues, and the continued existence of bankers' acceptances as a money market instrument is an excellent reason to look at bankers' acceptances in depth. In this chapter, we look in particular at how bankers' acceptances are created, the history of the market, and causes of its decline. Its evolution says a great deal about the substantial amount of financial innovation that has taken place in the financial markets over the years. It also illustrates the importance of the role that the money market has played in the growth of global trade.

HISTORY OF BANKERS' ACCEPTANCES

Bankers' acceptances or *bills of exchange*, as they are also called, are an old financial instrument dating back to the twelfth century when early forms of this instrument were used to finance international trade. For the two centuries prior to creation of the Fed, world trade was denominated and financed primarily in sterling, and a market in sterling bankers' acceptances flourished in London.

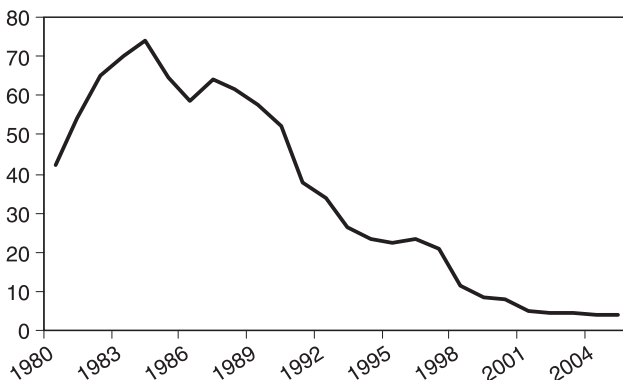
The founders of the Federal Reserve System, created in 1913, felt that a domestic bankers' acceptance market patterned after the London market should be developed to enhance New York's role as a center of international trade and finance; to promote U.S. foreign trade; and to

improve the competitive position of domestic banks. The Fed's founders thus empowered national banks to accept time drafts, which these banks were previously unauthorized to do. They also took other actions to support the growth of this infant market, including permitting the Federal Reserve to rediscount and purchase eligible acceptances.

By the late 1920s, with the Fed's help, a domestic market in bankers' acceptances had become well established, and more than \$1.7 billion of acceptances were outstanding. Then because of the Depression and later World War II, acceptances outstanding declined sharply. In May 1945, they totaled only \$104 million. After the war, as international trade revived, acceptance financing again became popular; and by the end of 1973, the total volume outstanding was \$8.9 billion. Since that time, this volume grew exponentially; then it tapered off (Figure 21.1), especially beginning in 1984 when the Federal Reserve said that it would no longer accept bankers' acceptances as collateral for the repurchase agreements it uses in its daily open market operations. Other factors have also contributed to the decline in the market for bankers' acceptances, including the shift to alternative financing vehicles, decreased market liquidity, and disintermediation, among other factors, which are discussed in more detail later in the chapter.

FIGURE 21.1

Bankers' acceptances outstanding (in billions of dollars)



Source: Bond Market Association

THE INSTRUMENT

A bankers' acceptance (BA) is a time draft; that is, an order to pay a specified amount of money to the acceptance holder on a specified date. BAs are drawn on and accepted by a bank that, by accepting the draft, assumes responsibility to make payment on the draft at maturity.

Under current Fed regulations, BAs may be created by accepting banks to finance foreign trade, the domestic shipment of goods, domestic or foreign storage of readily marketable staples, and the provision of dollar exchange credits to banks in certain countries.

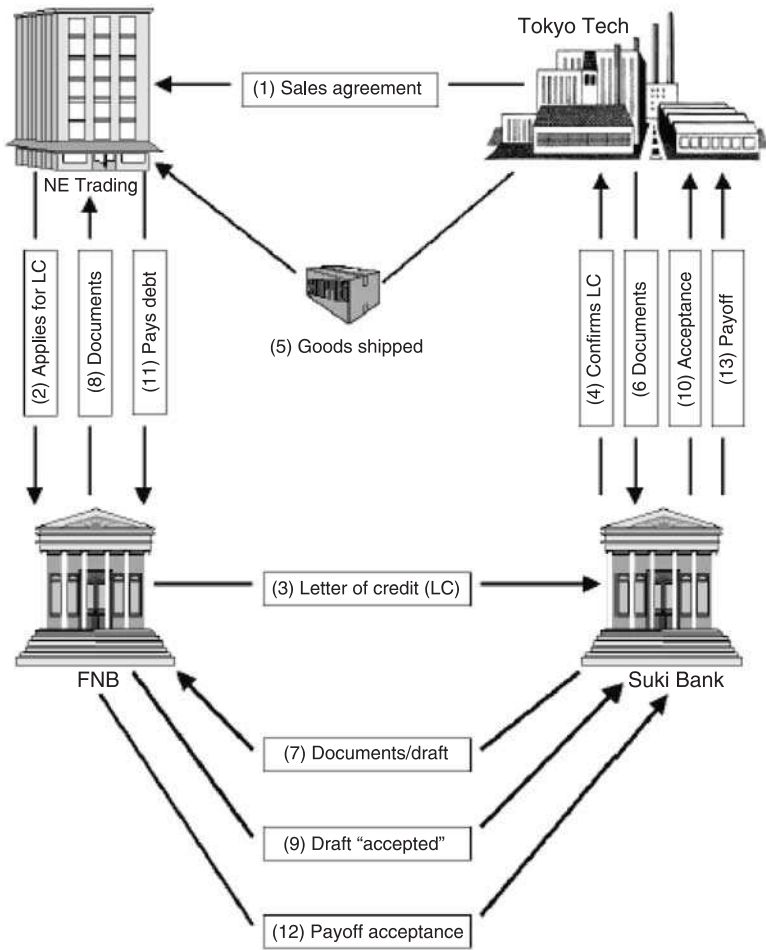
In Chapter 3, we give one example of how a BA might be created. A U.S. importer wants to buy shoes from a foreign seller and pay for them several months later. To obtain the necessary financing, he has his bank write a letter of credit for the amount of the sale, which it sends to the foreign exporter. When the shoes are exported, the foreign firm, using this letter of credit, draws a time draft on the importer's U.S. bank and discounts the draft at a local bank, thereby obtaining immediate payment for its goods. The exporter's bank in turn sends the time draft along with proper shipping documents to the importer's U.S. bank. This bank accepts the draft—making it an irrevocable obligation of the accepting bank—and pays out the proceeds of the draft to the exporter's bank. The accepting bank may then hold the accepted draft as an investment, or it may sell it in the open market. When the draft matures, the drawer is responsible for paying the accepting bank the face amount of the draft. Figure 21.2 illustrates the process.

If a U.S. firm uses BAs to finance exports, the process is the reverse. For example, a Japanese firm that wanted to purchase U.S. goods on credit might arrange for a letter of credit from a New York bank under which this bank would agree to accept dollar drafts drawn by a U.S. exporter to cover specified shipments to the Japanese importer.

While the drawing of BAs is frequently preauthorized by a letter of credit, in many instances BAs also arise out of contractual arrangements that are less formal than a letter of credit and are later supported by appropriate documentation. In effect, BAs can be created in various ways. Precisely how a given BA is created depends on who the participants in a transaction are and on the nature of that transaction. Creating BAs requires much specialized knowledge on the part of the accepting bank. Consequently, it is done only by banks that have foreign departments staffed by personnel who are knowledgeable about the market.

FIGURE 21.2

How a bankers' acceptance is created and resolved



Source: U.S. Comptroller of the Currency, *Comptroller's Handbook*, 1999

A large proportion of BAs used to be originated by Edge Act corporations, which are specialized subsidiaries, federally chartered by the Federal Reserve, and set up by banks to engage in international banking in order to provide all segments of the U.S. economy with a means of financing international trade, especially exports. Under sections 25 and

25(A) of the Federal Reserve Act, an Edge Act corporation can engage in only international banking or in other transactions that involve international trade. Top money market banks established Edge Act subsidiaries (subs) in financial centers around the country to service local business. It used to be that a bank, like Morgan, would issue Edge Act paper out of each of its subs: its Houston Edge, its San Francisco Edge, and so on. The trouble with this approach was that each sub had only limited capital. To solve this problem, Congress in 1982 permitted banks to merge their Edge Act subs into a single corporation; one sub took over the role of head office, and the others became branches. After that, U.S. banks began to issue all their Edge Act paper, wherever it is originated, out of a single head office. This change enhanced the creditworthiness of Edge Act paper by enlarging the capitalization of the corporations issuing it.

As has been the case for most of the years since Edge Act corporations began operating in 1919, the Federal Reserve was continuing to collect data from Edge Act corporations in early 2006, for purposes of supervising them. Forty-four Edge Act corporations were reporting data to the Fed as of January 2006, but only about 15% of the Edge Act corporations reported having bankers' acceptances on their balance sheets, and only one reported holding BAs as an off-balance sheet item. As a result, the Federal Reserve proposed in early 2006 that the three items related to bankers' acceptances be deleted from the data collection process. The Fed proposed to delete the three items and to instruct respondents to include any acceptance assets in the Other Assets and Other Liabilities portion of the Federal Reserve's reporting form, FR 2886b (Schedule RC), the Consolidated Report of Condition and Income for Edge and Agreement Corporations.

The Goods Financed

Bankers' acceptances used to be created principally to finance domestic exports and imports. This changed in 1974 when the price of oil rose dramatically. At that time, the Japanese and others began to borrow in the domestic BA market to finance their imports of oil. As a result, the BA market grew sharply, and it changed in character, with more than half of BAs outstanding in 1989 created to finance the storage or shipment of goods between foreign countries; these BAs represent financing of *third-country trade*: transactions in which neither the exporter nor the importer is a U.S. firm. For the storage of goods, in order for a product

to qualify as a “readily marketable staple,” a product or commodity must be traded constantly in ready markets with prices quoted frequently enough to make the price easily and definitely ascertainable, and the staple must be easy to realize by sale at any time. Bankers’ acceptances can be used only for storage if the commodities are expected to enter into trade in a relatively short time. These days, borrowers are more likely to opt for commercial loans when financing goods in storage, particularly because the legal systems of some countries make it difficult to obtain title to documents securing their trade transactions.

The prominence of third-country financing in the U.S. acceptance market reflects the fact that the U.S. market is the only world financial center in which there’s a wide market for dollar-denominated acceptances. There was talk in London of starting a market there in Eurodollar BAs, but nothing came of it. The mix of commodities financed in the BA market has not changed much in recent years; “grains,” which in bankers’ lingo covers wheat, corn, and soybeans, have historically been the largest single items; other big items are cotton and oil.

Characteristics

BAs, like T-bills, are a *discount* instrument, and yields on them are quoted on a discount basis. Most BAs are backed by documentation such as invoices, bills of lading, or independent terminal or warehouse receipts. This documentation is held by the accepting bank, so the instrument sold to investors is a simply drawn note (Figure 21.3). This note describes the nature of the transaction being financed and has been stamped “accepted” by the accepting bank. BAs are generally issued in *bearer* form. They may be drawn for varying maturities, but the largest volume of BAs traded in the market is in the 3-month area.

The amount of BA financing required by a borrower depends on the transaction he is financing. Five million dollars is a round lot in the brokers’ market, and typically BAs are issued in blocks of at least that size. Occasionally, an issuing bank will sell off a block as large as \$50 million.

Maturities of BAs at issue range from one to six months. A BA with an original maturity of more than six months becomes “ineligible” (see below), and it therefore trades at a concession to the market.

The credit risk to an investor for holding a BA is minimal. The instrument not only constitutes an irrevocable primary obligation of the accepting bank but is typically a contingent obligation of the drawer;

FIGURE 21.3

Form of bankers' acceptance

THE TRANSACTION WHICH GIVES RISE TO THIS INSTRUMENT IS THE IMPORTATION OF Chemicals EXPORTATION FROM USA TO JAPAN	ACCEPTED AND PAYABLE AT XYZ BANK NEW YORK, NEW YORK DATE January 5, 2006 BY (AUTHORIZED SIGNATURE)
\$ 1,000,000 180 DAYS AFTER Sight *****One Million U.S. Dollars***** DOLLARS	January 1, 2006 No PAY TO THE ORDER OF XYZ BANK ABC CORPORATION
XYZ BANK ONE MAIN STREET NEW YORK, NY 10000	

- (1) Drawer of draft

(2) Date of draft (draw date)

(3) Face amount

(4) Tenor

(5) Payable to

(6) Acceptance stamp
- (7) Sight date

(8) Accepting bank (drawee, issuing bank, creating bank, originating bank)

(9) Eligibility stamp (underlying transaction information)

(10) Endorsement of payee

XYZ Bank

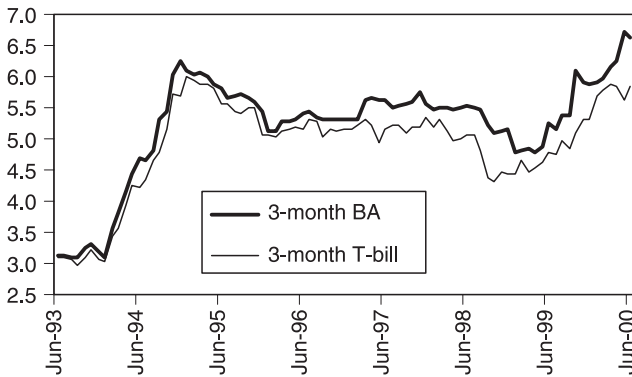
New York, New York

(10)

Note: This form is included only for purposes of illustration.
Source: Bond Market Association

it is also an obligation of any other institutions that have endorsed it. During the more than 80 years that BAs have been traded in the United States, no investor in BAs has suffered a loss of principal.

As shown in Figure 21.4, BAs trade at a spread above bills. In the late 1990s, the yield spread between 6-month bills and 6-month BAs was

FIGURE 21.4**Bankers' acceptances track T-bill rates**

Source: Federal Reserve

typically around 25 basis points or so, depending upon the interest-rate cycle and other factors related to perceptions about credit quality. For example, during the Asian financial crisis in 1998, when Russia defaulted on its debt obligations, credit spreads widened. Notably, there were also large disparities between individual Treasuries, despite the complete absence of differences with respect to credit quality. With no segment of the bond market spared, the yield spread between bills and BAs also widened, with the spread between 3-month bills and 3-month BAs widening to as much as 146 basis points. Traditionally, this spread was 15 to 25 bp in the 3-month area, but for reasons noted in earlier chapters, bills currently are more expensive when compared to other money market instruments; as a result, the BA-bill spread is wider than the historical average. As with other credit spreads, the BA-bill spread tends to widen when rates are rising and narrow when rates are falling.

ELIGIBILITY REQUIREMENTS

A high official of the New York Fed recalled that when he first came to the bank, one of the first questions he had to answer was: “Are yak tails readily marketable?” That’s not common knowledge, but fortunately he was able to come up with a quick answer, “Yes, they are”; he’d just read that yak tails were used in the United States to make high-quality Santa Claus beards.

And why, one might wonder, did the New York Fed care about the marketability of yak tails? The answer is that it determined whether a particular BA was or wasn't eligible.

To understand the BA market, one has to know something about eligibility requirements. Section 13 of the Federal Reserve Act of 1913 specifies that BAs eligible for discount at or purchase by the Fed had to meet certain requirements. These are quite complex and generally their spirit is that, for a BA to be eligible, it should finance a short-term (no longer than six months), self-liquidating commercial transaction of one of several specified types.

The implications of this set of criteria for eligibility have changed considerably over time. The initial intent and practice were that banks experiencing a temporary need for funds would sell to the Fed (that is, rediscount at the discount window) BAs and other eligible paper. Later, open market operations replaced the discount window as the Fed's primary tool for creating bank reserves, and the Fed's view as to what was an appropriate use of the discount window changed. Now, no bank would ask the Fed to rediscount a BA to maturity to raise funds because doing so would violate the spirit in which loans are currently extended at the discount window. In fact, at the end of the third quarter of 2006, the Federal Reserve was not holding any BAs for its own account.

The key importance today of the eligibility requirements stated in the original Federal Reserve Act is that only acceptances that are deemed eligible according to these requirements may be sold by member banks without incurring a *reserve requirement*. Eligible securities are also exempt from federal lending limits.

Currently, banks can and do create some ineligible acceptances. If they sell such acceptances, they incur a reserve requirement. The resulting reserve cost is passed on by the bank to the borrower. Thus, a borrower who requires ineligible as opposed to eligible BA financing pays a higher rate. The increased cost is one of the reasons why BAs are often shunned in favor of other financing vehicles.

Aside from the above, in order for the Fed to discount (i.e., purchase) bankers' acceptances, a number of other conditions must be satisfied. For example, the remaining maturity of the BA, excluding days of grace, must not exceed 90 days—unless the BA is being used to finance agricultural transactions for which the remaining maturity is no greater than six months. Another requirement is that the total amount of drafts that a bank accepts from any one party cannot exceed 10% of the accepting

bank's capital and surplus. In addition, the total amount from all parties combined that arises from domestic transactions cannot exceed more than 50% of the accepting bank's capital and surplus, and the total amount of drafts of all types that it accepts from all parties combined cannot exceed 150% of its capital and surplus (unless the Federal Reserve grants it permission to raise that figure, but to no higher than 200%).

Eligibility at the Fed

In the early 1970s, the Fed was active in the BA market in four ways: It bought BAs for its own portfolio and did repo with BA dealers as part of its normal open market operations; in addition, it lent to banks at the discount window against BAs as collateral, and it bought—adding its own guarantee to them—BAs in the open market for the account of foreign central banks.

Buying BAs for its own portfolio on its own initiative was nothing new for the Fed. To encourage growth of the BA market, the Fed did this continually from the inception of the BA market after World War I. By 1974, a big change had occurred in the composition of the BAs that were being created by the banks. At this time, the Fed decided to modernize its rules on what BAs it could purchase as part of its open market operations; responsibility for setting eligibility requirements for purchase was passed from the board of governors to the federal open market committee. One major change was that BAs with a maturity of up to nine months, provided they met other eligibility requirements, became eligible for purchase even though they were ineligible for discount.

At this time, when the Fed bought BAs, it did not usually ask a dealer to tell it in advance which bank's paper the dealer was offering; the Fed made no attempt to distinguish gradations in quality among different banks' paper. Instead it asked the dealers only that they offer it *prime* paper. The Fed's main criterion for determining that a bank's paper was prime was that it be traded in reasonable volume and with reasonable frequency in the secondary market: that the paper was acceptable to the market.

In the market's view, however, there were and still are quality gradations in paper, and tiering exists in the rates paid by different institutions. To avoid acquiring undue amounts of paper considered by the market to be less attractive, the Fed instructed the dealers to offer and deliver to it a reasonable mix of acceptances created by prime banks. If the Fed's holdings of any one bank's paper became unduly large, it would temporarily

refuse to accept paper from that bank until its holdings were reduced to an acceptable percentage.

The Federal Reserve Bank of New York has for years purchased for foreign official accounts (mainly other central banks) government securities, agency securities, and BAs and has held the securities on their behalf. These holdings are known as *custody holdings*. Thirty years ago, the Federal Reserve guaranteed the acceptances it purchased for foreign official accounts as part of a reciprocal relationship with other central banks during the early years of the Federal Reserve System. It was a way of encouraging the development of the market for BAs and, hence, foreign trade. The Fed's guarantee made BAs an attractive investment, particularly considering their already high credit quality as well as their favorable credit spreads to bills. With the number of guaranteed BAs growing rapidly and in the absence of justification for continuing the guarantees to a relatively small group of investors, the Federal Reserve decided in 1974 to end its guarantee of BAs for its foreign accounts.

Because of the Fed's decision to stop guaranteeing BAs, the number of foreign banks buying them dropped by about two-thirds, and the holdings of remaining foreign customers fell to about \$300 million in 1975. To cushion the effect on the BA market of this large drop in foreign purchases, the Fed temporarily increased its purchases of BAs by a like amount.

Then, gradually, the Fed let its BA holdings drop. Finally, in March 1977, when the Fed was buying for its portfolio only an insignificant number of BAs—\$1 million or \$2 million daily—it determined that the BA market was sufficiently mature so that it no longer needed the Fed's support, and it stopped buying BAs for its portfolio.

Eligibility requirements with respect to purchases once had greater significance. BAs that were eligible for purchase were also eligible for repo, and the Fed continued to do repo with BA dealers until July 1984. At that time, it discontinued such repos. The president of the Federal Reserve Bank of New York put it this way, "There are some people ... who misinterpret the Federal Reserve eligibility as a good housekeeping seal." Eligibility requirements nevertheless remain important to banks because eligible bankers' acceptances are exempt from both reserve requirements and lending limits. In addition, dealers for bankers' acceptances in the secondary market have adopted the Federal Reserve's purchase requirements for their own protection and generally will not discount acceptances that do not comply with them.

Currently, banks may use as collateral for loans at the discount window any BAs that are eligible for purchase by the Fed and any other paper that meets the general eligibility standards established by the discount window. Nevertheless, although the Fed can still purchase BAs in the conduct of its open market operations, it is unlikely to do so unless the market becomes more active. In 2002, a Federal Reserve study group for system operations on alternative instruments for open market and discount window operations concluded that bankers' acceptances were unlikely to be a useful vehicle for Federal Reserve investment.

BANK PRICING AND SALE

When a bank creates an acceptance, it prices the BA as follows: First, it checks the rate at which paper of the maturity it is creating and carrying its name is trading in the dealer market; that is, the rate at which it could sell the acceptance. To this rate it adds any reserve cost it would incur in selling the acceptance if the acceptance is deemed ineligible for sale in the dealer market. To the sum of these two costs, the bank adds on a commission for its services. Back in the middle 1970s, the standard acceptance fee was 1.5%. Time and competition changed this such that U.S. banks now charge around 25 basis points or less.

Selling versus Holding

Once a bank creates a BA, it can either hold the paper as part of its loan portfolio or sell it. Bank attitudes on this point vary considerably. It used to be that, when the Fed was tightening and banks were short on reserves, they would normally choose to sell BAs to be able to fund more straight loans. In contrast, when money was easy, there was more variability in bank behavior. Some banks consistently sold a large proportion of the BAs they created to investors. For other banks, the decision whether to sell BAs was strictly an investment decision.

Noted one such banker, "We will hold BAs if we think that rates are coming down and will sell them if we think that rates are going up. However, our decision on BAs is usually weighted toward selling them out rather quickly because, if you have a profit in them and you sell them out fast, you get the profit for sure and right away for the whole maturity of the BA. If you wait, you are speculating on what will happen to the cost of funding. BAs are a relatively low-yield instrument, and spreads are narrow,

so it doesn't take much of a rise in rates to take you from a profitable to an unprofitable position in BAs. Also, the cost of funding BAs is higher for a bank than for a dealer because a bank incurs a reserve requirement when it repos acceptances unless it does the repo with another bank. Because of this, the cheapest way for us to fund BAs is usually with fed funds." To his point, a bank could lose all its acceptance commission in a very short amount of time if rates rise before the BA is sold. A quote given at 9 a.m. could be significantly different from where the market is at 10 a.m., for example.

Another banker made the same point more succinctly, "Whenever we position BAs, it is a rate decision. I tell our trader, any time we think it is a good idea to buy 90-day money, he had better not build up any assets—just sell the BAs we create out to the market."

The environment in which banks currently operate—heightened concern over capital ratios, balance-sheet usage, return on capital, foreign currency translation risks, and low liquidity—has further diminished the meager appetite banks once had for positioning BAs.

Borrowing via the BA Route

In the past, a firm with a financing need that could be covered in the BA market faced a relatively simple choice: go the BA route or borrow at a floating-rate prime. The advantage of BA financing was that it was cheaper, and a firm's decision to use BA financing was typically a rate decision.

As rates rose and became more volatile, the spread of prime over the lower commercial paper rate got as wide as 350 bp at one point, and borrowers began to view prime as a punitive rate. To retain borrowers, banks changed their lending terms dramatically (Chapter 6). Today, a firm financing a commodity transaction will—depending on its size, credit, and relationship to its bank—have a menu of borrowing alternatives from which to choose: a loan at a floating prime, a loan denominated in foreign currencies, a fixed-rate advance, or BA financing. Also, it may have access to the commercial paper market, where attractive financing rates have lured borrowers away from BA financing.

A firm with a financing need will seek to borrow as cheaply as possible. Thus, today as before, a borrower's choice as to which financing method to use is typically a rate decision. The commercial paper market remains the cheapest source of short-term financing available to firms, with financing rates typically close to the fed funds rate. Borrowing via

the BA route is a way for a firm that lacks direct access to the open market—because it cannot sell commercial paper—to obtain indirect access to this market; the access is more expensive because the firm must pay the accepting bank a fee for opening the door for it to this market.

Many domestic firms that use the BA market are financing commodity imports and exports, sometimes in large amounts. These firms have tremendous financing needs. Also, because of the extreme variability of commodity prices, their financing needs are equally variable and also unpredictable. Therefore, such firms, besides trying to minimize their borrowing costs, feel the need to maintain as many sources of financing open to them as possible. Although much of the financing is obtained outside the BA market, some firms finance part of their needs in the commercial paper market, part in the BA market, and part with bank loans.

Bank loans become an attractive alternative to BA financing when spreads are reasonable and the borrower is unsure of how long he will need financing. If a borrower repays a BA early (as Fed regulations require him to do if the underlying transaction is terminated early), no proportion of the bank commission on the BA is repaid to him. He does get a pro rata rebate on the discount fee but minus a $\frac{1}{4}$ or so.

MARKET, STOCK IN TRADE

Prior to 1984, BAs outstanding grew phenomenally, and all signs indicated that this trend would continue. More cost-conscious firms wanted to use the BA market to shave their borrowing costs, and bankers—always inventive—were looking for new ways in which BA financing might be used.

One impediment to continued growth of the BA market was an antiquated and economically hard-to-defend rule incorporated in the Federal Reserve Act. This rule limited the amount of BAs a bank could have outstanding to an amount equal to 100% of its capital and surplus. With Fed permission, granted semiautomatically, this limit could be extended to 125%. In mid-1982, the 125% rule, which never had been a binding constraint on BA creation, became so for many major banks, some of whom sought to get around the rule by issuing more Edge Act paper. In the fall of 1982, Congress passed legislation permitting banks to issue eligible acceptances equal to 150% of their capital and surplus. Congress also made it easier for banks to use acceptances to finance domestic trade. Both changes seemed likely to stimulate BA creation by the major domestic banks.

However, BAs originated by domestic banks actually declined thereafter. One reason was intense competition from Japanese banks, who by the late 1980s originated over 50% of the BAs sold in the U.S. market. Other foreign banks were also originating dollar BAs, but only in relatively small amounts. Because BAs, even if sold, remain a contingent liability of the originating bank, one that must be backed by capital, and because of the importance banks today attach to improving their capital ratios, it's not clear that U.S. banks were overly pained to lose a lot of BA business to Japanese banks. Certainly, they weren't prepared to work for the low commissions that Japanese banks found acceptable.

A second reason for the decline in the origination of BAs by U.S. banks was the general decline in size of the BA market. This reflects the fact that, for an issuer, BAs were always a cumbersome financing tool; and, today, the typical borrower is likely to have more financing alternatives, especially given the growth of the commercial paper market. Perhaps, for example, the borrower is an A-2, P-2 issuer, which are credit ratings considered satisfactory by the major rating agencies; if so, he'd be comparing the all-in BA rate he'd have to pay with rates on A-2, P-2 paper, maybe with the cost of a bank loan obtained via a bid feature in his backstop facility, and maybe with a loan drawn on an international bank at LIBOR plus a spread.

CHANGES IN HOW THE MARKET IS DEALT

Prior to 1974, the Fed supported the market for regional bankers' acceptances by buying such paper for the account of foreign buyers and adding its guarantee to it. When the Fed stopped this practice, some of the regional banks took a beating. The year 1974 was characterized by tight money and well-publicized difficulties in the banking industry. Investors then became very credit conscious. Prior to that time, most big investors would buy the paper of any \$1 billion bank. But in 1974, some investors began to revise their criteria and decided that size wasn't equal to quality. With a number of them saying they would take only the top 10 or 15 banks' paper, the regional banks were forced to pay up, and tiering developed, with the market assigning different yields to banks in order to reflect differences in perceptions about their credit risk.

Later, thanks partly to the credit problems at certain money center banks, investors began looking more at regional BAs; and, in a number of cases, they liked the quality they saw. Thus, today, there is more regional

paper around, especially now that many of the commercials aren't as involved in the market as they once were.

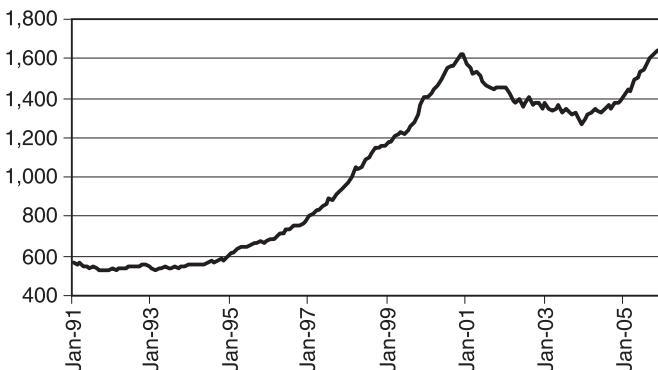
THE SHRINKAGE OF THE BA MARKET

Perhaps the most prominent reason why the BA market has shrunk over the years is the increased availability of alternative sources of financing. Borrowers have many more choices for financing their international transactions, their inventory investments, or whatever, and are now able to obtain financing through a wider variety of channels, many of which are in the banking sector. The vast majority of the financing, however, is now done outside the banks. This *disintermediation* has increased over the years, with institutional borrowers opting for funding in the commercial paper (CP) market where funding costs are lower and the borrowing process is far less cumbersome than it is for BAs.

We show in Figure 21.1 the decline in the amount of BAs outstanding. In contrast, Figure 21.5 shows the very large growth that has occurred in the CP market. Although the amount outstanding fell during the years 2001 through the very early part of 2004, the decline was largely the result of factors related to the recession of 2001 and a series of corporate scandals (discussed in Chapter 22). The rapid growth of the CP market eventually resumed, and the total amount outstanding stood at \$1.9 trillion

FIGURE 21.5

Commercial paper outstanding (in billions of dollars)



Source: Federal Reserve

in November 2006, a tally that was almost double the amount of Treasury bills outstanding at the end of 2006. This makes the CP market the single biggest funding source in the money market, whose size was put at \$3.70 trillion at the end of the second quarter of 2006 by the Bond Market Association. The impact of the CP market on the BA market has only worsened over the years because the CP market has drawn institutional investors away from the BA market. It is not uncommon in the financial markets for the shrinkage of a particular market to become self-feeding because of the loss of institutional investors, as has been the case in the BA market.

Other factors contributing to the shrinkage of the BA market include the cumbersome nature of BAs as a financing tool; currency translation risks (discussed later); the weakening of Japan's banking system during the 1990s; the lack of an easy hedge; and the preference among banks to focus on other sources of fee income, which for a number of years has been one of the largest growing sources of income in the banking sector.

A part of the decline in interdealer trading in the BA market must be attributed to the fact that demand has not declined while supply has. Today, it seems that a lot more BAs, once they are created, get sold immediately—either directly by the issuer or via a dealer—to a retail customer who, more often than not, holds the paper to maturity. Thus, there's little floating supply in the market for dealers to trade.

THE BA MARKET TODAY

Today, the BA market is much smaller than it once was, and it is also more fragmented. As mentioned, the total amount of BAs outstanding stood at just \$4 billion in the middle of 2006, and the size of the individual issues is smaller than they were in the days when there were a number of money center banks involved in the market. Moreover, the market for Japanese BAs has disappeared, and there is only scant issuance by other foreign bank branches, for example, French, Swiss, German bank branches—the so-called “Yankee issuers.” These days, the foreign issuers that do issue BAs tend to be Canadian and British, although even their issuance is scant.

Many of the regional banks that offer BAs do so to boost the number of services that they can offer to their customers. The BA market is not a lucrative market for them, but many see the offering of products such as BAs as an imperative in an intensely competitive banking environment.

Generally, the acceptance fees that the regional banks receive on their BAs are boosted by the fact that local investors don't demand as much yield on BAs as do institutional investors. This helps to make the BA market a more viable market for the regional banks. In fact, a bank's own internal bond, trust, or retail department can contact local investors without having to use an intermediary, thereby reducing the cost of marketing BAs to investors.

Because of the small size of the BA market, liquidity levels are low. Nevertheless, banks can still buy and sell acceptances as short-term money market assets at prices that reflect their fair market value.

Dollar Exchanges

One of the ways in which exporters to the United States utilize the BA market is to create *dollar exchanges*, which are BAs that are issued in anticipation of export proceeds. An exporter may, for example, decide to draw a draft on a U.S. bank, which would accept the draft, discount it, and then credit the net proceeds to the exporter's bank, usually a foreign bank. When the exporter receives the proceeds from its export, the dollar acceptance can then be liquidated (paid).

Preexport

Exporters sometimes use BAs to finance exports that must be made in sufficiently large quantities to qualify for shipment. In such cases, the borrower must have a firm export sales order, and the term of the preshipment financing should be for 30 days or less. Banks can and do finance preexport acceptances for longer than 30 days, but not for more than 180 days. Terms longer than 180 days are discouraged because loans of that length could be classified as working capital and hence considered a loan for purposes of determining lending limits.

Prepayment

The nature of international trade results in the receipt of funds that sometimes arrive before a borrower is required to liquidate (pay) an outstanding BA. In such cases, most banks require that the BA be prepaid in order to avoid any possibility that the funds will go somewhere else. Banks aren't permitted to prepay or eliminate their own acceptance liability before maturity. Prepayments can sometimes save borrowers some of their financing expenses; banks will typically refund some of the funding costs.

Investors in BAs

Today, the biggest investors in BAs are money funds, pension funds, municipalities, savings banks, thrifts, and assorted other smaller investors. Currently, the list of active BA dealers is far shorter than it was in the BA's heyday. This reduces the allure of the BA market to the institutional investor and is one of the factors behind its shrinkage. Those who trade BAs often have to call a number of dealers before finding BAs that fit their needs because these days dealers are unwilling to hold positions caused by the lack of market liquidity.

Years ago, a dealer could deal in BAs without retail, just with other dealers. He could buy paper from a large dealer, show it to the Street, and get lifted. Today, a dealer needs retail; spreads are narrower than they used to be, and it's tough to make money trading dealer to dealer.

Maturity Distribution of BAs

A lot of things affect the maturity distribution of outstanding BAs, including concerns by issuing banks about the aesthetics of their balance sheet at the end of the quarter. There is definitely more paper three months and in, and that is the most liquid area of the curve by far. In the three-months area, there are both new 3-month BAs and 6-month BAs that have been outstanding for three months. BAs trade in the same way regardless of whether they are fresh or have been outstanding for some time, but they become scarcer the longer that they have been outstanding.

Since BAs are issued on every business day of the month, to give them more homogeneity for trading purposes, BAs maturing in a given month are quoted for early and late dates in the month, for example, a bid or an offering might be for early or late January. Also, paper that is exactly six months from maturity is actively traded and trades on the run. The least liquid BAs are the four- and five-month maturities. Eligible BAs do not go beyond six months in maturity.

Average Size of Trades

It's difficult to generalize about the size of BA trades; investors tend to favor transactions of \$1 million or more, but the transactions are often much larger than that. That said, transactions of \$100,000 or so are more common these days than they once were. Trades that are smaller than \$1 million are considered odd lots and will trade at a price disadvantage.

Similarly, unusual quantities of, say, \$1.3 million are considered odd amounts and will also trade at a disadvantage. Maturities of less than 30 days also trade at a price disadvantage. Typically, dealers prefer to buy large blocks, and those with good retail hanker to get blocks of at least \$5 million or more. There are muni bodies and money funds that prefer blocks and that will even pay up to get them. However, these blocks aren't on the market often, and, when they are, they're not there for long. "You see few of those big deals," noted one trader, "so when one comes to market, you want to jump on it." The majority of trades, whatever their size, are not for even amounts; they may be for \$5.5 million, \$7.37 million, or some round amount plus an *odd tail*.

A large dealer that has lots of little as well as big clients is happy to get the odd tail because, among its retail, are buyers looking to invest just a small amount.

TIERING

Once upon a time, investors wanted BAs issued only by money center banks, and consequently, such paper was expensive relative to all other paper in the BA market. Today, *tiering* is a lot more complex because investors pay more attention to an individual issuing bank's credit than to its class—whether it's regional, Yankee, or whatever.

Bankers' acceptances are traded on the basis of a bank's credit rating. In other words, a BA's yield will reflect the market's assessment of the credit condition of the accepting bank. There are two tiers of banks in the BA market. The first tier consists of large U.S. banks. The second tier consists of Edge Act banks, foreign banks, and lesser-known regional banks. Rates on BAs for first tier banks will generally be lower than those for second tier banks. That said, there are other factors that can affect the rates, including the size of the issue, the size of the transaction, and the delivery date of the BA. Some institutional investors go so far as to create a list of banks whose acceptances they would be willing to purchase.

RISKS IN THE BA MARKET

The bankers' acceptance market is typically viewed as one carrying very little risk. After all, BAs are traded on the basis of the accepting bank's credit rating. Nevertheless, there are a number of risks associated with bankers' acceptances, some of which have grown in recent years because

of the decreased size of the BA market. These risks are present for the parties involved in BA transactions as well as for those who invest in BAs.

In a 1999 report, the Office of the Comptroller of the Currency (OCC), a bureau of the U.S. Treasury that charters, regulates, and supervises all national banks as well as the federal branches and agencies of foreign banks, identified six key risks associated with bankers' acceptances.¹ The risks include transaction, compliance, credit, liquidity, foreign currency translation, and reputation. For purposes of the OCC's discussion of risks, the OCC assesses banking risk relative to its impact on capital and earnings. From a supervisory perspective, the OCC sees risk as the potential that events—expected or unexpected—may have an adverse impact on a bank's earnings or capital.

Let's take a closer look at each of the six risks cited by the OCC.

Transaction Risk

Transaction risk is the current and prospective risk to earnings and capital that can arise from fraud, error, and the inability to deliver products and services, maintain a competitive advantage, and manage information. These risks are exacerbated by the extremely challenging competitive environment, with companies pitted against one another from all parts of the world. Moreover, the information age has increased the strain on businesses to stay competitive and in tune with the latest technological advances both in terms of product development and information flow.

Compliance Risk

Compliance risk is the current and prospective risk to earnings or capital arising from violation of, or nonconformance with, laws, rules, regulations, prescribed practices, internal policies and procedures, or ethical standards. This risk is also present in situations in which laws are open to misinterpretations. Companies that have compliance problems can find themselves—sometimes very quickly—in situations where they are forced to pay fines, money for damages, or civil money penalties. Moreover, a company's daily operation could be threatened by damage done to its reputation through failures in compliance.

¹ *Bankers' Acceptances Comptroller's Handbook*, U.S. Comptroller of the Currency, September 1999.

In cases in which a bank is found to be noncompliant and is the accepting bank in a bankers' acceptance transaction, the Federal Reserve will generally impose a retroactive reserve requirement upon that bank. If the accepting bank acted on information from the borrower that it thought was accurate but which was instead erroneous, the bank would not be able to collect compensation from the customer to cover the reserves.

Credit Risk

Credit risks arise when the borrower fails to meet the terms of the BA set out when it was created. This is a risk that is not only the accepting bank's; the exporter and investors in the BAs all bear this risk. In this case, it is the bank's financial position that takes precedence given that the accepting bank will ultimately be responsible for paying the obligation at maturity to the holder of the BA (usually an importer's bank).

Liquidity Risk

Liquidity risks arise when a bank is unable to meet its obligations without incurring unacceptable losses. These can occur when banks mismanage their assets and liabilities or when they fail to recognize or address changes in market conditions that affect the ability to liquidate assets quickly and with minimal loss in value. Liquidity risks are not considered high in the BA market, mostly because BAs are short-term financing vehicles. Even for some of the more distressed companies, short-term liquidity is usually both identifiable and well defined. Moreover, the accepting banks are usually known entities; folks know whom they are dealing with when they create and invest in BAs.

Foreign Currency Translation Risk

Foreign currency translation risk is the current and prospective risk to capital arising from the conversion of a bank's financial statements from one currency to another. Companies that translate their cash flows from one currency to another face risks associated with the ongoing fluctuations in the foreign exchange market, where the translation values of currencies changes every day. The Asian financial crisis posed such risks in 1997 and 1998 when the foreign exchange market was extraordinarily volatile.

Reputation Risk

In the early 2000s, a rash of corporate scandals damaged the reputation of many major corporations and invited suspicions on others. This impaired the abilities of some companies to raise money in both the capital markets and via the banking sectors. The commercial paper market was imploding during that period, for example. Reputation risks can expose a company to all sorts of difficulties, including funding, legal, and day-to-day dealings with customers as well as suppliers and others that the company depends upon to stay a going concern.

THE FINANCING OF DEALER POSITIONS IN BAs

Banks usually finance any BAs they position with fed funds, because if they repoed them, they would incur a reserve requirement.

Nonbank dealers can finance BAs they position with repo or with dealer loans. Since repo is cheaper, dealers normally use it. Delivering out collateral would be expensive for a dealer repoing BAs, so normally he does short-term, typically overnight, *letter* (also called a *hold-in-custody*) repo: he holds the physical BAs and gives the investor a list of those BAs that serve as collateral for his repo.

On a normal day, a dealer with good retail and thus good access to repo money can repo BAs at maybe a nickel close to the funds rate.

The spread will be smaller the fewer BAs a dealer is looking to finance; it will also be smaller if there is a shortage of government collateral in the repo market.

REVIEW IN BRIEF

- A *bankers' acceptance* is a time draft; that is, an order to pay a specified amount of money to the acceptance holder on a specified date. BAs are usually used to finance international transactions.
- Bankers' acceptances have been used for centuries, as far back as the twelfth century, and they played a major role in the growth of international trade during the twentieth century.
- Bankers' acceptances are discount instruments, with maturities usually not longer than 180 days. The credit risk associated with

BAs is very low, because they reflect upon the credit of the accepting bank.

- The Federal Reserve no longer purchases BAs for its own account, but it maintains certain eligibility requirements that banks continue to adhere to in order to gain favorable accounting treatments for BAs and to raise the standard by which they issue BAs.
- The BA market is much smaller than it once was, with \$4 billion outstanding in the middle of 2006. The BA market has been replaced by other instruments, particularly the commercial paper market.
- Despite the relatively high credit quality of bankers' acceptances, there are nonetheless a variety of risks associated with BAs including transaction risk, credit risk, and foreign currency translation risk.

The Commercial Paper Market

The commercial paper market is very large, especially when considering that all commercial paper matures within 270 days or less. In the summer of 2006, the commercial paper market was almost double the size of the U.S. Treasury bill market, with \$1.8 trillion outstanding compared to \$930 billion for T-bills, making it one of the largest sources of funds in the money market and the money market's single largest financial instrument.

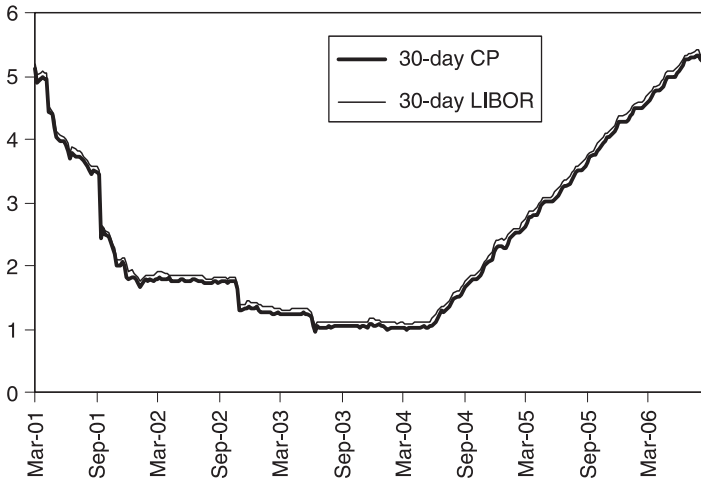
Commercial paper (CP) is an unsecured promissory note with a fixed maturity. The issuer promises to pay the buyer some fixed amount on some future date but pledges no assets, only her liquidity and established earning power, to guarantee that promise. Commercial paper is exempt from SEC registration if the issuer meets one of several alternative sets of requirements.

In its early stages, the commercial paper market was a parochial market that tended, by investment banking standards, to be populated by less sophisticated, less intense, less motivated people. The paper sold was also mundane, definitely plain vanilla. Also, the commercial paper market, judged by outstandings, was just one of several important sectors of the money market.

Today, all that has changed dramatically. The wholesale market for short-term CDs is dead; volume in the BA market is meager; meanwhile, the commercial paper market has expanded to the point where commercial paper issuance outstrips Treasury bill issuance. A measure of the growth in importance of the commercial paper market is that, whereas in 1970, commercial paper accounted for 23% of the total outstandings of the major money market instruments (BAs, T-bills, CP, CDs), by the

FIGURE 22.1

Commercial paper (CP) trades at a spread slightly below LIBOR



Source: Federal Reserve

middle of 2006, the figure had soared to about two-thirds of outstandings. Moreover, by the 1990s, the volume of nonfinancial commercial paper outstanding was generally between 25% and 40% of the outstanding volume of debt issued by financial firms.¹ Also, whereas in the mid-1960s the amount of nonfinancial commercial paper outstanding represented just a fraction of lending to commercial and industrial borrowers, today it is close to 13%, although this tally is down from its peak in 2000 when it was at a much higher 32% before corporate scandals, historically low interest rates, and other factors brought the level down. Still, the overall level of commercial paper outstanding now far exceeds the total amount of commercial and industrial bank loans outstanding, which stood at \$1.140 trillion in August 2006.

As noted below, the commercial paper market has grown not only in size but also in diversity of issuers and in types of paper issued. Today, U.S. commercial paper trades at a spread off LIBOR, the international cost of money to borrowers (Figure 22.1); and a variety of foreign players are

¹ Pu Shen, "Why Has the Nonfinancial Commercial Paper Market Shrunk Recently?" Federal Reserve Bank of Kansas City, *Economic Review*, first quarter 2003.

active in the market. Also, sophisticated market players are keenly attuned to any factors that might affect interest-rate levels, and they routinely use sophisticated tools: foreign-exchange swaps, interest-rate swaps, and options (in the form of a cap on rates paid).

As with bills and BAs, commercial paper rates are quoted on a *discount* basis. A very small amount of commercial paper is issued in interest-bearing form; the rate paid on such paper is the quoted discount rate converted to the equivalent simple interest rate.

The commercial paper market is definitely a wholesale market; typically, the minimum sale, specified by the offering memorandum, is \$100,000 to \$250,000. On occasion an issuer will sell in smaller denominations.

INVESTORS IN COMMERCIAL PAPER

Investment companies, principally *money funds* and *mutual funds*, are the single biggest class of investors in commercial paper (Table 22.1). Ranking second are funding corporations. For money funds, commercial paper is

TABLE 22.1

Major holders of commercial paper as of March 31, 2006
(in billions of dollars)

Entity	Amount
Funding corporations	538.7
Money market mutual funds*	489.8
State and local governments, excluding employee retirement funds	178.1
Nonprofit organizations	169.3
Rest of the world	144.4
Mutual funds	107.0
Nonfarm nonfinancial corporate business	98.9
Security brokers and dealers	61.6
Life insurance companies	39.7
Private pension funds	34.2
State and local government employee retirement funds	28.9
Government-sponsored enterprises	8.4
Credit unions	2.3

*Table does not include data from other types of mutual funds, as is shown below.
Source: Federal Reserve

a natural: it is short in maturity and low in credit risk; also, because the number of issuers is large, it offers opportunities for diversification of credit risk. At the end of the first quarter of 2006, money market funds held \$490 billion of the \$1.8 trillion of commercial paper that was outstanding, mutual funds held \$107 billion, and funding corporations held \$539 billion. Other important buyers of commercial paper in order of largest holdings are state and local government bodies (including pension funds run by such bodies for their employees), corporate liquidity portfolios, insurance companies, private pension funds, and foreign investors.

Thrifts once were, depending on rate spreads, sometimes buyers of commercial paper. Thrifts may count commercial paper as part of their liquidity reserves if such paper carries a rating of A-2, P-2, or better. Given their high cost of funds, it would have been backward thinking for thrifts to buy such paper at the rates such paper paid in early 2006, which helps to explain why they held no commercial paper at that time. If thrifts consider buying lower-rated or unrated commercial paper, that paper is compared with instruments such as mortgages and junk bonds. Today, the yields are not there for thrifts to be active buyers of commercial paper, but they used to be major buyers in the late 1970s and early 1980s when rates were high and quality-yield spreads were consequently wide.

ISSUERS OF COMMERCIAL PAPER

The large market for commercial paper in the United States was, until the early 1950s, unique to the United States. Its origins trace back to the early nineteenth century when firms needing working capital began to use the sale of open market paper as a substitute for bank loans. Their need to do so resulted largely from the United States' unit banking system. Elsewhere, it was common for banks to operate branches nationwide, which meant that seasonal demands for credit in one area of the country, perhaps resulting from the movement of a crop to market, could be met by a transfer of surplus funds from other areas. In the United States, where banks were restricted to a single state and more often to a single location, this was difficult. Thus, firms in credit-scarce, high-interest-rate areas started raising funds by selling commercial paper in New York and other distant financial centers.

For the first 100 years or so, borrowers in the commercial paper market were all nonfinancial business firms: textile mills, wholesale jobbers, railroads, and tobacco companies, to name a few. Most of their paper was placed for a small fee by dealers; the principal buyers were banks.

Then in the 1920s, the market began to change. The introduction of autos and other consumer durables vastly increased consumers' demand for short-term credit, which in turn led to the creation and rapid growth of consumer finance companies.

One of the first consumer finance companies was the General Motors Acceptance Corporation (GMAC), which financed consumer purchases of General Motors cars. To obtain funds, GMAC (*Gee Mack* in Street argot) began borrowing in the paper market, a practice that other finance companies followed. Another innovation by GMAC was to short-circuit paper dealers and place paper directly with investors; this made sense because GMAC borrowed such large amounts that it could save money by setting up in-house facilities to sell its paper. GMAC is today the largest issuer of commercial paper.

Despite the advent of finance company paper, the paper market shrank during the 1920s, stagnated during the 1930s, and then slumped again during World War II. By 1945, commercial paper was a relatively unimportant instrument. Since then, the volume of commercial paper outstanding has grown steadily. One reason is the continuing growth in the sale of consumer durables, often done on credit. These days this could mean large-screen televisions or computers.

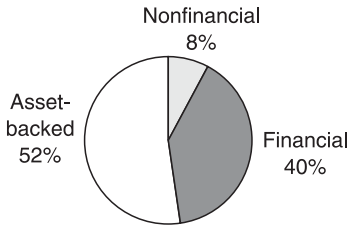
A second factor was the Fed's decision to pursue tight money with a vengeance on a number of occasions starting in the mid-1960s. In 1966 and again in 1969, firms that were accustomed to meeting their short-term borrowing needs at their banks found bank loans increasingly difficult to obtain. On both occasions, money market rates rose above the rates banks were permitted to pay on CDs under Reg Q, and banks therefore had difficulty funding new loans. Once firms that had previously borrowed at banks short term were introduced to the paper market, they found that most of the time it paid them to borrow there because money obtained in the open market was cheaper than bank loans except when the prime rate was being held by political pressure at an artificially low level.

Industrial and Finance Company Paper

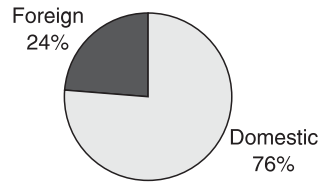
Today, nonfinancial firms—everything from public utilities to manufacturers to retailers to service firms—still issue paper, and their paper, which is referred to as *industrial paper*, accounts for about 8% of all paper outstanding (Figure 22.2). Such paper is issued, as in the past, to meet seasonal needs for funds and as a means of interim financing; that is,

FIGURE 22.2**The U.S. commercial paper market as of August 2006**

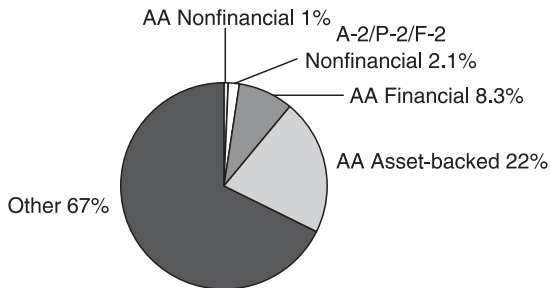
Total Commercial Paper Outstanding



Foreign Versus Domestic, Excluding Asset-Backed



Daily Issuance Profile, Week Ended August 25, 2006



Source: Federal Reserve

to fund the start-up of investment projects that are later permanently funded through a long-term bond issue. This is often called *bridge financing*. In contrast to industrial borrowers, finance companies have a continuing need for short-term funds throughout the year; they are now by far the biggest borrowers in the commercial paper market.²

Domestic Bank Holding-Company Paper

In tight-money years, domestic bank holding companies have joined finance companies as borrowers in the commercial paper market. Many U.S. banks are owned by a holding company—an arrangement offering the advantage that the holding company may, by law, engage in activities in which the

² “Other” financial in Figure 22.2 includes not only finance companies, but companies engaging in mortgage banking, factoring, finance leasing, business lending, and other activities.

bank may not. Initially, bank holding companies borrowed in the commercial paper market partly to fund bank operations by purchasing a portion of the bank's loan portfolio. In August 1970, the Fed ruled that funds channeled to a member bank that were raised through the sale of commercial paper by the bank's holding company or any of its affiliates or subsidiaries were subject to a reserve requirement. This ruling eliminated the sale of bank holding company paper for such purposes. Today, bank holding companies, which are active issuers of commercial paper, use the money obtained from the sale of such paper to fund nonbank activities in areas such as leasing and credit cards, to fund offshore branches, and for sundry other purposes that vary from bank to bank.

Foreign-Bank Commercial Paper

Over the years, a number of foreign banks have opened branches in the United States, and one prime motive for their doing so was to expand their dollar liability base. Bank holding companies are unique to the U.S. banking system. Thus, when foreign banks issue commercial paper in the United States, they do so at the bank level; and the buyer gets paper that ranks *pari passu* with the bank's other deposits. Some municipal investors and thrifts are not permitted to buy foreign securities. To attract funds from such investors, a number of foreign banks set up Delaware subsidiaries, where many companies go to gain favorable tax treatment. These are just a borrowing conduit for the bank, and the monies borrowed via the sub also rank *pari passu* with bank deposits. To make the sale of commercial paper a cost-effective way to raise dollars, foreign banks avoid reserve requirements by investing offshore any dollars thus obtained.

Many foreign-bank commercial programs are now many billions of dollars in size, and they include issuers such as Credit Lyonnais, Société Générale, BNP Paribas, TD Bank Financial, Rabobank Nederland, Canadian Imperial Bank of Commerce, Credit Suisse First Boston, Dresdner Bank AG, Bayerisch Landesbank, and even Unitas Ltd. of Finland. Merrill, Goldman, JPMorgan, and other dealers are active sellers of foreign-bank commercial paper.

Own-Name Dealer Paper

Most of the principal dealers in commercial paper also sell their own commercial paper. Doing so increases their liquidity by giving them one

more source of short-term funds; it also increases their range of choices with respect to the maturity structure of their short-term liabilities; and probably, it decreases their average cost of funding—certainly it does so to the extent that it enables a dealer to avoid financing her positions at high-cost, bank dealer-loan rates.

Paper Sold to Garner Foreign Exchange

Years ago, foreign companies in the United Kingdom, France, Germany, and other countries found that the cheapest way for them to raise short-term funds in their native currency was to borrow Eurodollars and swap them back into their native currency.³

Goldman led several such borrowers in the U.S. paper market; it showed them that they could shave 50 to 150 bp off their short-term borrowing costs by selling U.S. commercial paper for dollars and then having Goldman swap those dollars into their native currency. A private British company began the parade of foreign borrowers into the U.S. commercial paper market. It was followed by several French companies, including Gaz de France and other French utilities, whose paper sometimes carries a government guarantee.

Today, Goldman, Merrill, and other dealers do a brisk business in foreign-name paper. The list of issuers has expanded to include firms from Sweden, Norway, Finland, Luxembourg, Belgium, and various other countries. It has also expanded to include major *sovereign borrowers*, such as the Kingdom of Sweden, which is a sophisticated user of every debt market—the United States, Europe, and others—in which it can borrow to its advantage. Foreign borrowers must contend with two particular factors when deciding upon whether to borrow in the U.S. market. First, they must be willing to go through the rating-agency process and the market-development process that is required for a foreign borrower to access the U.S. commercial paper market. Second, those who choose against these processes may find that, for them, issuing in the European commercial paper market is more attractive than issuing in the U.S. market.

Today, foreign issuers—sovereign, bank, industrial, and other—account together for a smaller share of the total paper issued in the U.S. commercial paper market compared to 1990 when they were about 20% of the market (Figure 22.2).⁴ In August 2006 foreign issuers accounted for 10% of the

³ For foreign-exchange swaps, see Chapter 18.

⁴ The number gets bigger the more broadly one defines “foreign.”

overall market (excluding asset-backed commercial paper), or \$179 billion. While some foreign issuers still swap dollars borrowed in the U.S. commercial paper market into their native currencies, many others, including most foreign banks, borrow in this market to satisfy a natural need for dollars.

Municipal Commercial Paper

It was not until several years after taxable money funds had been successfully launched that *tax-exempt money funds* were begun. One reason for the slow start was the scarcity that existed at that time in the market of short-term, tax-exempt paper. Once tax-exempt money funds opened shop, they grew rapidly; and their growth created a demand for the invention of new short-term instruments that would be attractive to municipal borrowers. One such instrument was muni commercial paper; another was demand notes (see Chapter 25).

Muni borrowers were attracted to the idea of issuing commercial paper because it permits them, when the yield curve is upward sloping, to borrow at cheaper rates than they could if they sold muni notes, which usually have an original maturity of 6, 9, or even 12 months. The first muni commercial paper was issued by the same types of borrowers that issue revenue bonds: a power authority might use commercial paper to finance an inventory of fuel; a corporation, to finance construction that it would later fund long term by issuing industrial revenue bonds. Later, general obligation (GO) issuers—Connecticut, Massachusetts, Oregon, Big Mac (the Municipal Assistance Corporation), and Columbus, Ohio, to name a few—came into the market and began issuing commercial paper as a permanent alternative to other financing sources.

All muni commercial paper is top rated. Most issuers back their paper with revolving credits, some with straight bank lines, a few—the minority—with letters of credit or a guarantee from a group that insures, for a fee, municipal bonds.

Today, there is not much *tax-exempt* commercial paper around. To a great extent, muni bodies lost their ability to issue such paper because of tax reforms. Also, muni bodies found that it ran counter to their conservative fiscal management to sell a lot of commercial paper, as doing so added volatility and unpredictability to their borrowing costs. There are, however, a few municipal commercial paper programs still up and running that issue paper. For example, municipalities sometimes issue tax-exempt commercial paper to help fund universities. Turnpike authorities have also

issued commercial paper, depending on their constant revenue streams to repay the debt, as have nonprofit institutions.

BANK LINES

While commercial paper may have an initial maturity as long as 270 days, many issuers stick to the 30-days-and-under maturity range, and today the average maturity for commercial paper is about 30 days, according to the Federal Reserve's Web site. Some contend that the average maturity is closer to 40 days (Shen, 2003). The average maturity varies, particularly when the Federal Reserve is expected to change interest rates. For example, when the Fed is expected to lower interest rates, some issuers will try to issue paper that matures very close to the date on which the fed funds rate is expected to be changed. Conversely, when the Fed is expected to raise interest rates, issuers will try to have paper that extends beyond the date on which the funds rate is expected to be changed. Investors are wise to this, however, and many shorten the average maturity of the securities they buy.

Because of the short average maturity of commercial paper outstanding, issuers must currently pay off billions of dollars of maturing paper each day. In fact, data from the Federal Reserve show that the average daily volume in commercial paper, which is a good proxy for daily issuance, given the small secondary market that exists for commercial paper, was \$179 billion in August 2006. Downing and Oliner put the daily issuance figure at \$100 billion.⁵ Individual issuers sometimes are able to pay off maturing paper on a seasonal basis with funds generated from their operations, and sometimes they pay it off with funds generated by the sale of long-term debt. But by far the bulk of all maturing commercial paper is paid off by *rolling* that paper: the issuer sells new paper to get funds to pay off maturing paper.

This creates a risk for both the issuer and the investor; namely, that some adverse turn of events might make it extremely expensive, even impossible, for the issuer to sell new paper to pay off maturing paper. To obviate this risk, all issuers back their outstanding paper with *bank lines of credit*. These credit lines are not meant to boost the credit quality of the issues; rather, they are meant to provide emergency funding in case of a liquidity crisis.

⁵ Chris Downing and Stephen Oliner, "The Term Structure of Commercial Paper Rates," Federal Reserve Board, *Economics Discussion Series*, April 2004.

An issuer that did not pay the insurance premium, which the cost of bank lines really is, might at some point find itself in a position in which difficulties in marketing new paper forced the issuer to sell off assets at fire sale prices or to cut back on the volume of its business. Issuers' concern over this eventuality has a basis in fact. When the Penn Central went bankrupt with \$82 million in commercial paper outstanding in 1970, this created difficulties for all issuers, particularly those in weak financial condition.

More recently, California's power crisis in 2000 and 2001 led two large California utility companies to default on their maturing commercial paper: Pacific Gas and Electric and Southern California Edison. Although the defaults followed a nine-year stretch where no nonfinancial commercial paper issuer defaulted on its obligations, the defaults nonetheless had widespread implications, contributing to a weakening of investor demand. The episode once again highlighted the importance of having backup credit facilities for commercial paper. When Tyco International was smitten in 2002 with questions about its corporate governance, it was forced to make an *orderly exit* from the commercial paper market, utilizing bank loans to pay off \$4.5 billion of maturing commercial paper. Similarly, Lucent Technologies was forced to make an orderly exit after its commercial paper was downgraded in October 2000. When it did, many other telecom companies were forced to do the same. British Telecom, Corning, Motorola, Nortel Networks, and AT&T all saw their top-tier commercial rating downgraded. Another reason commercial paper issuers pay to acquire bank lines, whether they think they need them or not, is that investors will buy only paper backed by bank lines.

Amount of Lines

Most issuers attempt to maintain 100% line backing for their paper or a figure close to that. There is, however, much variability among issuers and even for individual issuers over time. The main variable is the issuer's credit rating. For top-tier issuers, the minimum backup facility is typically 75% of the total size of the issuance. For lower-rated issuers, the facility normally provides 100% backing (Shen, 2003).

An issuer who has a big seasonal need to borrow, say, at Christmas, will allow its percentage of line backing to fall temporarily during its peak borrowing period. Also, an issuer that pays down the amount of commercial paper it has outstanding because it had funded some of its debt with

a new long-term issue may go *overlined* for a period; that is, have line backing in excess of 100%. Banks that grant a firm a line do not like to have that firm terminate the line after one month and ask to have it extended again six months later; so going overlined at times is a price issuers pay to maintain good relations with their banks. Most of the largest of commercial paper issuers have line backing that is well below 100%, chiefly because they borrow so much that they would have difficulty getting 100% line backing.

How much line backing is really needed by an issuer as insurance depends on its position. Top issuers have had to pay up at times for money, but they have never experienced real difficulty in selling their paper even during periods of crisis (Penn Central) or when money was tight.

Types and Cost of Lines

Commercial paper issuers use different types of lines to back their paper. Under a standard line agreement, if the issuer activates its line, its borrowing automatically turns into a 90-day note. Issuers also use *swing* lines that permit the issuer to borrow one day and repay the next if it chooses. Swing lines are attractive to issuers because issuers occasionally experience short, unanticipated needs for cash; on a given day an issuer may not sell as much paper as it expected to, but it may be able to cover this deficiency on the next day.

It used to be normal practice for issuers to pay for lines with compensating balances; and the standard formula was a 10% balance against the unused portion of the line and a 20% balance against any monies taken down under the line. Today, those numbers have the ring of ancient history.

Over the years, it became increasingly common for issuers to pay a fee instead of balances for lines, or a fee plus reduced balances. Banks initially resisted the trend toward fee lines but gradually gave in on that point. Except when money is very easy, it is cheaper for an issuer to pay a straight fee of say $\frac{1}{4}$ or $\frac{1}{2}\%$ for a line than it is for the issuer to hold compensating balances with its bank. Foreign banks entering the United States encouraged the trend toward fee lines by offering U.S. companies cheap fee lines as a sort of loss leader—to obtain some business and to justify their existence here.

A number of commercial paper issuers back some small portion of their outstanding paper with *revolving lines of credit*. Under a revolver, the bank customer pays a commitment fee of as much as $\frac{1}{4}\%$ on top of the

normal compensation it pays the bank for the line. In exchange for that commitment fee, the bank guarantees that it will honor the line for some number of years. The big advantage such a line offers the customer is that it guarantees that, no matter how tight money gets or what happens to its position, it can borrow from its bank. As icing on the cake, the issuer obtains a second advantage—because it can turn any borrowing under the line into a term loan, the issuer may treat commercial paper backed with a revolver as long-term debt for statement purposes.⁶

Most firms that take out revolvers do not have a top rating and want to ensure that money will be available to them from their banks under any circumstances.

Some issuers of commercial paper use Eurodollar revolving lines of credit to back some portion of their outstanding paper. Utilities are one example in this regard.

Competition from the Sale of Bank Loan Participations

As we note in Chapter 23, money center banks have started structuring into most committed, commercial paper-backstop lines what is called a *bid option*: in addition to borrowing at the committed, formula rate, the line holder can come in and ask its banks to bid for paper at a rate less than the committed rate. At times, a commercial paper issuer can, using such bid options, get money cheaper than in the commercial paper market.

Such loans, which typically range in maturity from 30 days to 9 months, are made by banks at razor-thin margins. Thus, to make money on them and to protect their ROA, banks sell out the bulk of such loans, in the form of loan participations (a new money market instrument), to corporate liquidity portfolios and other investors. From our quick preview of bank loan participations, it should be clear that this new business competes directly with the issuance of commercial paper via dealers. A natural question is this: Does one borrowing method have an inherent cost advantage over the other? Some note that bank loan participations do affect the use of commercial paper, because there are some companies that use both markets. Nevertheless, the commercial paper market is much larger and hence is utilized much more often.

⁶ Some multiyear credit lines give lenders a chance to take a second look at a company before permitting them to take down funds under their line. If a multiyear line agreement contains a “no change in material circumstances” clause, borrowing under it may not be treated as long-term debt.

One dealer observed: “It’s primarily A-2, P-2, F-2 credits who find borrowing from a bank that sells loan participations to be competitive [with selling commercial paper]. All industrial companies rated A or better can raise funds in the commercial paper market at rates below where banks fund themselves; rarely do such borrowers find bank loans competitive.”

RISK AND RATINGS

Since the early 1930s, few issuers of commercial paper have defaulted. In the case of dealer paper, one reason is that, after the 1920s, the many little borrowers that had populated the paper market were replaced by a smaller number of large, well-established firms. This gave dealers, who were naturally careful about whose paper they handled, the opportunity to examine more thoroughly the financial condition of each issuer they dealt with.

Between 1965 and 1990, the number of firms issuing at any time a significant quantity of paper to a wide market increased from 450 to over 1,600; of those, several hundred were non-U.S. borrowers. These days about 500 firms issue paper daily.

Only five issuers of commercial paper failed between 1975 and 1990, and there were, as we said earlier, no defaults from 1990 until 2000.⁷ Three of the defaults during the period of 1975 to 1990 were small domestic finance companies that got caught by tight money; in each case the losses to paper buyers were small, \$2 million to \$4 million. The fourth firm that failed was a Canadian finance company that had sold paper in the U.S. market; losses on its paper totaled \$35 million. The fifth failure, one that shook the market, was that of the Penn Central, which at the time it went under had \$82 million of paper outstanding.

One silver lining of the Penn Central’s failure is that rating of paper became more widespread and rating standards were tightened. Today, close to 100% of dealer and direct paper is rated by the three major SEC-designated nationally recognized statistical rating organizations: Moody’s, Standard & Poor’s, and Fitch.

Paper issuers willingly pay the rating services to examine them and rate their paper, since a good rating makes it easier and cheaper for

⁷ In June 1989, Integrated Resources, an issuer of “junk” commercial paper (sold via Drexel) defaulted. That default rattled the \$5 billion market for junk commercial paper, but not the near \$500 billion market for A-1, A-2 paper. See more on junk paper later in the chapter.

them to sell paper. The rating companies, despite the fact that they get fee income from issuers, have the interests of the investor at heart because the value of their ratings to investors and, thereby, their ability to sell their rating services to issuers depend on the accuracy of their ratings. The worth to an issuer of a top rating depends on the track record of borrowers who have held that rating.

Each rating company sets its own standards, but their approaches are similar. Every rating is based on an evaluation of the borrower's management, earnings, and balance sheet. Just what a rating company looks for depends partly on the borrower's line of business; for example, the optimal balance sheet for a publishing company differs from that of a finance company. Nonetheless, one can say in general that the criteria for a top rating are strong management, a good position in a well-established industry, an upward trend in earnings, adequate liquidity, and the ability to borrow to meet both expected and unexpected cash needs.

Since companies seeking a paper rating are rarely in imminent danger of insolvency, the rating agencies' main focus is on *liquidity*—can the borrower come up with cash to pay off its maturing paper? Here the rating company looks for ability to borrow elsewhere than in the paper market and especially the ability to borrow short term from banks. Today, for a company to get a paper rating, its paper must be backed by bank lines.

Different rating firms use different classifications to grade borrowers. Standard & Poor's rates companies from A for highest quality to D for lowest. Also, it subdivides A-rated companies into four groups according to relative strength, A-1+ for companies in the top tier, and A-1 down to A-3. Moody's uses P-1 (short for prime-1), P-2, P-3, and NP (not prime). Fitch uses F-1+, F-1, F-2, and F-3 for investment grade, F-4 for speculative grade, and F-5 for defaulted companies (Table 22.2).

TABLE 22.2

Commercial paper credit ratings

	Moody's	S&P	Fitch
Superior	P-1	A-1+ or A-1	F-1+ or F-1
Satisfactory	P-2	A-2	F-2
Adequate	P-3	A-3	F-3
Speculative	NP	B and C	F-4
Defaulted	NP	D	F-5

Investors in commercial paper are a conservative lot, and reflecting this, the vast majority of issuers have, today, top ratings from both Moody's and Standard & Poor's (Figure 22.2), and most companies enter the commercial paper market with a top-tier rating. When companies fall out of the top tier, their issuance of commercial paper normally declines, and many are forced to take orderly exits from the market.

Although the rating firms have a good track record with respect to their ability to assess default risks, their record is not perfect. Such was evident in 2001 when Pacific Gas & Electric and Southern California Edison defaulted on their commercial paper programs in December 2000, despite top-tier credit ratings.

However, top-tier credit ratings aren't enough to shield investors from the ravages of market volatility, as was the case in 1998 when the commercial paper market shrunk in response to the Asian financial crisis.

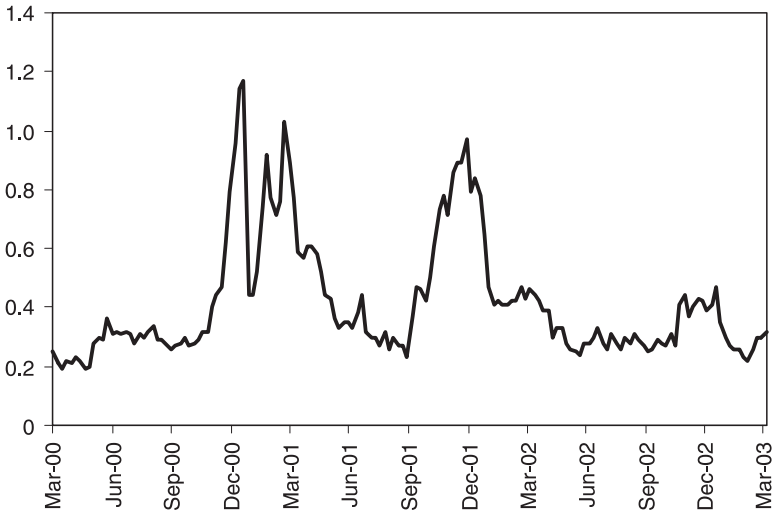
Rating Tiering

In the 1960s, when the commercial paper market was small, all issuers paid similar rates to borrow there, in part because of the homogeneity of issuers. Then, after the Penn Central's failure, periods of tight money, and the entry of far more names into the market, investors became far more credit-conscious; they wanted top names, and rate tiering developed in the market. This tiering became a function not only of an issuer's commercial paper rating, but also of its long-term bond rating. Many investors wanted to buy only unimpeachable credits and looked to an issuer's bond rating as a quick way to check the credit of an issuer with whom they were unfamiliar. Today, the market still distinguishes, although less so than formerly, between A-1+ issuers with a triple-A bond rating and those with only an A+ bond rating; now, the typical investor takes the view that, since commercial paper is short-term paper, it is the commercial paper rating that is more important because it focuses on an issuer's current liquidity—on its ability to repay short-term debt.

The spread at which A-1+, P-1, and F-1+ paper trades to A-2, P-2, and F-2 paper varies depending on economic and financial conditions, as well as other factors such as corporate defaults and geopolitical events. When the Fed is raising interest rates, investors become more concerned about credit risk, and the spread tends to widen. However, in the Fed's tightening episode of 2004–2006 the rate hikes had almost no impact, likely owing to the strong condition of corporate balance sheets at that

FIGURE 22.3

Yield spread between top-rated 45-day commercial paper and A/P-2/F-2-rated 45-day commercial paper (in percentage points)



Source: Bloomberg

time and general confidence in the economic outlook. In recent years, much greater impact has resulted from the other variables. For example, after Tyco's orderly exit from the market in early 2002, and amid a series of other corporate scandals, spreads widened sharply (Figure 22.3). Spreads also widened sharply at the start of the 2001 recession and after Russia's default in 1998.

After a period of tight money, investors, seeking to maintain past portfolio yields, tend, as rates fall, to become *yield buyers*: they switch out of low-yielding, top-rated paper into higher-yielding, second-tier paper; and, as they do, they drive down the spread between A-1 and A-2 paper to the point where it may be only about a $\frac{1}{4}$, or less, as was the case following the Fed's interest-rate cuts in 2001. Whether money is easy or tight, only a limited number of investors will buy P-3 or unrated paper from the few dealers who sell it (Figure 22.2). Investors willing to buy low-quality paper include some insurance companies, that, because they hold large portfolios of long-term corporate paper, publicly offered bonds, and private placements, that track on an ongoing basis the earnings and

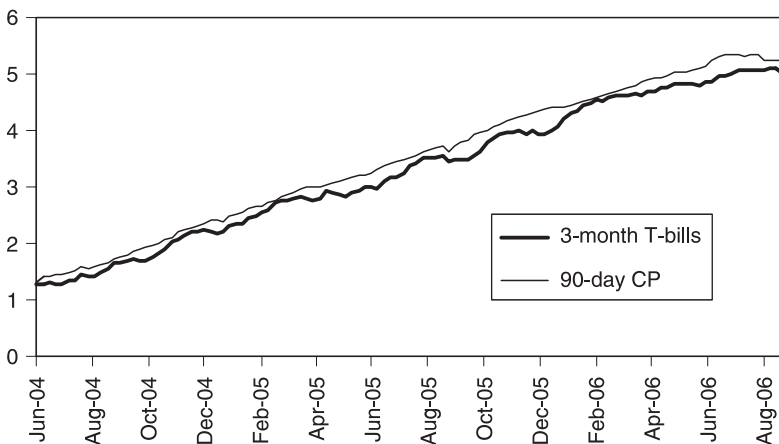
condition of a wide range of firms. The appeal of junk commercial paper is that paper sold by a single-B credit may, depending on market conditions, pay a half percentage point or more than the rate paid on paper issued by an A-1, P-1 credit. In fact, there were a few occasions from 2000 to 2002 when the spread was wider than 150 basis points. Belying its name, junk commercial paper has rarely defaulted.

Commercial Paper versus Other Yields

Today, commercial paper yields a bit more than Treasury bills of comparable maturity (Figure 22.4). Normally, the spread is at its widest when the Fed is raising interest rates—first because commercial paper exposes the investor to credit risk; second, because commercial paper is less liquid than bills. The spread between the yields on commercial paper and bills can also be severely affected by other factors. For example, the widening of this spread during the bursting of the financial bubble in 2000 reflected not only a flight to quality by investors, but also a large demand for Treasuries by foreign central banks, particularly the Bank of Japan, which, to support the exchange value of the dollar, were selling their currencies and buying dollars, many of which they then invested in U.S. T-bills.

FIGURE 22.4

3-month T-bills versus 90-day commercial paper (CP)



Source: Federal Reserve

The really interesting thing about the spread between commercial paper rates and other rates is that, in recent years, the rate that the commercial paper rate has really tracked most closely (on an apples-to-apples, simple-interest basis) is LIBOR, the international cost of short-term money (Figure 22.1). That's globalization of markets on the march.

TYPES OF COMMERCIAL PAPER SOLD

In large part because of the efforts of commercial paper dealers to expand their business and the inflow of funds into money market funds, which created a huge new demand for commercial paper, the menu of commercial paper available has gone from one flavor, plain vanilla, to many. Most commercial paper, whatever its flavor, is exempt from registration according to one of the sections of the Securities Act of 1933, has a maturity at issue of 270 days or less, and is high in credit quality.

3(a)(3) Commercial Paper

Most commercial paper in the market is still plain vanilla, *3(a)(3) paper*. Such paper is exempt under section 3(a)(3) of the Securities Act of 1933, which exempts from registration paper that is used to finance "current transactions" and that has a maturity at issue of nine months or less.

4(2) Commercial Paper

Section 4(2) of the Securities Act of 1933 and rule 506 promulgated thereunder exempt what is called *4(2) paper* from registration. Such paper must meet various conditions, the most important of which are that it be sold only to "accredited" investors, that it not be publicly offered or sold, that it not be purchased by an investor with the intent to resell, and that an investor who does resell does so in an exempt transaction.

Borrowers who sell 4(2) paper do so to finance noncurrent transactions such as acquisitions, stock repurchase programs, and other long-term assets. When 4(2) paper, which is also known as *privately placed* paper, was first introduced, it traded cheap in relation to plain vanilla paper because it was viewed by investors as less liquid. Investors then changed their view, and 4(2) paper now trades at the same level or sometimes lower than other commercial paper of the same credit quality, chiefly because of the relationships that the direct issuers have with the buyers of their paper.

Financial companies are the largest issuers of privately placed paper, as it is cost effective for them to do their own selling given the frequency of their placements in the market. In August 2006, there was \$332 billion of privately placed paper outstanding.

LOC Commercial Paper

A small number of firms, domestic and foreign, borrow in the commercial paper market by issuing *LOC (letter of credit) paper*. This paper is backed by a letter of credit from a bank. In the LOC, in exchange for a fee, the bank gives an irrevocable and unconditional guarantee either that it will in all cases pay off the paper at maturity or that it will do so if the borrower lacks sufficient funds to do so. Either way, the investor is fully protected. LOC paper is exempt from registration under section 3(a)(2) of the Securities Act of 1933, which exempts securities “issued or guaranteed by any bank.” In essence, the issuer is renting the bank’s credit rating.

An LOC is a form of credit enhancement, one that substitutes the credit of the bank writing the LOC for that of the issuer. In rating LOC paper, the rating agencies analyze not the credit of the commercial paper issuer, but the credit of the bank issuing the LOC and the precise guarantee provided by that LOC. Thus, by obtaining a letter of credit, an issuer might, for example, get a P-1 rating on its paper, whereas the same paper with no LOC would get only a P-3 rating or no rating.

The first LOC-backed commercial paper program was established in 1969, but this financing technique did not blossom until the late 1970s and early 1980s. At that time, LOC paper grew in response to several factors. One was the huge appetite of the burgeoning money funds for high-quality, short-term paper, an appetite that bank liabilities, which were growing slowly due to sluggish loan demand, could not sate. Also, at this time the nature of banking was changing; money center banks were looking for sources of fee income; and fee income was precisely what writing an LOC provided a bank.

During the 1980s, LOC paper became a successful money market product, and it represented between 5% and 10% of total commercial paper outstanding. Today, with just \$35 billion outstanding, it represents slightly less than 2%. The decline improved perceptions about the safety of commercial paper, which has been boosted by the high credit quality of commercial paper issuers and the rarity of defaults on commercial paper over the years.

LOC paper has been issued principally by several categories of borrowers. First and largest are domestic borrowers who either are a less-than-investment-grade credit or prefer not to disclose their financials fully and publicly. Next are nuclear fuel trusts. Since the mid-1970s, some utilities have accessed the commercial paper market via LOCs to finance their nuclear fuel cores. Typically, a utility doing so sets up a single-purpose corporation to issue commercial paper and purchases nuclear fuel with the proceeds. This structure provides the utility with off-balance sheet financing. However, the issuing corporation, being only nominally capitalized, needs a bank LOC to be able to sell commercial paper. A third group issuing LOC paper is real estate developers for whom the sale of LOC paper is a cheaper source of funding than are bank loans. Insurance companies also use LOC paper, although obviously on a very small scale. Finally, many foreign companies use LOC paper to raise funds in the United States. They may do so to reduce their need to provide additional capital to a U.S. sub, to avoid full disclosure of their financials or to be able to use the proceeds to finance long-term capital rather than current transactions.

Other Forms of Commercial Paper

We have already mentioned the sale by foreign companies of U.S. commercial paper to obtain, via a foreign-exchange swap, proceeds in their native currencies. In discussing dealer paper, we describe two more innovative forms of commercial paper that dealers have created recently. Finally, there is Euro commercial paper, which we cover at the end of this chapter.

DEALER PAPER

U.S. commercial paper is issued both via dealers and directly by issuers. Because of the aggressive efforts of dealers to develop new products that are attractive to both investors and borrowers, dealer paper outstanding has, over the years, grown much more rapidly than has direct paper outstanding, which today represents just under 20% of total commercial paper outstanding (Table 22.3). Adding to the shift has been the increased issuance of commercial paper by smaller issuers whose borrowing is too small to justify having a direct sales force.

The Fed's figures have no detail in their breakdown of total dealer paper by type of issuer. Nevertheless, for years industrial issuers have been the biggest by far.

TABLE 22.3

Directly placed U.S. commercial paper, as of August 31, 2006 (in billions of dollars)

Directly placed	338.5
Financial	216.9
Nonfinancial	19.7
Asset-backed	101.9

Source: Federal Reserve

Competition among Dealers

While the commercial paper business is concentrated, competition among dealers is fierce, and the pressure on margins is, said one dealer, “incredible.”

The same dealer went on to equate running a dealing operation in commercial paper with running an oil refinery: “If you are not running volume through the system, you cannot make it in this business. At a 70% utilization rate, you maybe break even or are losing a bit of money. At 80%, 85%, or 90% utilization, you begin to make real profits, profits that justify the allocation of more resources to and continued investment in the business.”

To an investment banking firm or to a big bank moving in that direction, an attraction of being a successful commercial paper dealer is that being a client’s dealer in commercial paper often becomes for a dealer the core of many investment banking relationships; certainly, a commercial paper dealer has to be in daily contact with most of its clients, and they with the dealer. A dealer who walks away from the commercial paper business is going to aggravate a lot of clients, and that in turn will affect other elements of the dealer’s businesses, such as underwriting new corporate issues.

Underwriting and Other Fees

Years ago, commercial paper dealers charged their clients a fee of $\frac{1}{8}$ of a percentage point, which works out to \$3.47 per \$1 million per day. Today, after years of competitive pressure, that number is a bit smaller, but it varies a great deal depending upon the issuer’s credit history, issuance size, and general market conditions. On one side of the fee scale are

dealers who reason that they invest too much in the way of people, technology, or whatever to budge much on rates and stay profitable over the long run. On the other side are dealers whose pitch to clients is: “We may not have the broadest distribution, but we will work for only 5 bp.”

Issuers also pay fees to financial advisors and rating agencies, and they incur fees for printing marketing materials and for remarketing. The fees are hardly prohibitive, however, especially when put in the context of the attractive rates that commercial paper can be sold at compared to other forms of short-term credit. Moreover, because commercial paper is exempt from registration with the SEC, issuers of commercial paper are exempt from registration fees.

Monitoring Credit

In recent years there have been no bankruptcies among prime commercial paper issuers. This in part is the result of the rigorous credit monitoring that goes on at the major dealers. “We have,” noted one dealer, “a senior and a junior analyst responsible for following every one of our credits and a credit policy committee that monitors all of our issuers. In most cases, our issuers are also investment banking clients of our firm. So we have corporate or global finance coverage, which gives us intimate knowledge of what a firm’s financial condition is at any given time. If we were to fear that a company might be dramatically downgraded or in the worst case go bankrupt, we would take that company out of the market well before that time. That is the theory of the liquidity backup lines that go with commercial paper issuance.”

Dealers steer clear of issuing unrated commercial paper. Most dealers will not touch the stuff; said one, “Even if you charge 25 bp to sell shaky paper, the risk-return just is not there. You have to invest more in credit monitoring, which carries costs; and if one of your shaky issuers goes under, you have to have sold a lot of paper for 25 or 50 bp to recoup the costs and the anguish of resolving that.” Years ago, Drexel was the primary issuer of unrated paper, at one point doing business with 50 to 60 issuers. For dealers involved in the issuance of high-yield bonds, selling unrated commercial paper is a natural offshoot.

Risk and Market Liquidity

Historically, it has taken a lot to shatter confidence and liquidity in the commercial paper market as occurred, for example, after the failure of

the Penn Central. It is notable, for example, that after the stock market crash in October 1987, there was tremendous volatility in the money markets and a marked widening of quality spreads; nonetheless, all sectors of the commercial paper market continued to display tremendous liquidity. The lesson here, then, one which was repeated in the early 2000s after the defaults by utilities companies in California in 2000 and then Tyco's problems and the broader concerns about corporate governance, is that the commercial paper market is likely to be rattled more by events in the commercial paper market than by events outside of it.

One striking difference between the commercial paper market of the present and the commercial paper market of the past is that, now, there are many hundreds of billions of dollars out there that must be invested short term every day. Thus, investors as a practical matter cannot say en masse, "I am not going to invest in commercial paper." For all practical purposes, the U.S. money market is, today, commercial paper, T-bills, and term repo; these three instruments dwarf all else in outstandings.

Issuance of Dealer Paper

An issuer's dealer does several things for it. First, the dealer, who is in close contact with market conditions, will each day advise the issuer, if the issuer wants such advice, on what rates the issuer should post that day on the various maturities of its paper that it wants to sell. Second, the dealer will post the issuer's offerings—maturities, rates, and amounts—to its salespeople. The salespeople, who have contacts with a wide range of investors, will then seek, via calls to investors, to sell the issuer's paper.

A dealer's final responsibility to an issuer may be to position any paper that the issuer tried but failed to sell that day. Generally, dealers are not keen on positioning paper. Said one, "We are like a candy store: we buy it [commercial paper], we sell it, we have *no* interest in owning it." Still, if an issuer takes a dealer's advice in pricing its paper—sets what the dealer thinks are reasonable rates for reasonable amounts of paper—the dealer will agree, as part of its relationship with the issuer, to position any of the issuer's paper that remains unsold. The amounts involved are usually small, and the positions assumed are usually only overnight.

In the old days, the dealer's trader who had responsibility for a given issuer just posted rates and took orders. Today, she is much more of a true trader. "There is," noted one dealer, "a real tactical game going on. The trader has to be able to manage the pricing intraday, to know when to

TABLE 22.4

Commercial paper rates on September 1, 2006

	AA Nonfinancial	A-2/P-2/F-2 Nonfinancial	AA Financial	AA Asset- Backed
1-day	5.25	5.30	5.22	5.27
7-day	5.20	5.31	5.24	5.27
15-day	5.25	5.34	5.25	5.27
30-day	5.20	5.37	5.24	5.28
60-day	5.20	5.34	5.25	5.29
90-day	5.19	5.38	5.26	5.28

Source: Federal Reserve

take opportunistically more or less money out of the market. If the trader is doing a good job, she will have said to her client at the beginning of the day, 'We think that producer prices could do this, and if that happens, this is where the market will be.' Also, if during the day, fed funds or credit spreads move, the trader will instantly go back to the client and say, 'The market is going against us, and I think we ought to do thus and so.' Most clients give the trader discretion: she can sell paper within bands anywhere she wants.

"A trader has to be on her toes all the time, because issuers monitor our performance on a retrospective basis. There is the Fed data for commercial paper⁸ [Table 22.4] and all of the other indices against which issuers can spread the rates they pay to see if they are getting improving, deteriorating, or constant price performance. We also monitor our performance daily." With the fierce competition that exists among dealers, every dealer is under intense pressure to get the best rates it can for each of its clients. Computerization has only intensified these pressures, with the transparency of the market much greater than ever before. Today, an issuer can check rates via information providers such as Bloomberg and trade over Internet sites such as TradeWeb, which in August 2006 was listing the combined inventories of nine of the largest commercial

⁸ The Fed reports data on commercial paper rates interpolated from data on certain commercial paper trades settled by The Depository Trust Company. The trades represent sales of commercial paper by dealers or direct issuers to investors (that is, the offer side). The 1-, 2-, and 3-month rates are equivalent to the 30-, 60-, and 90-day dates reported on the Federal Reserve Board's commercial paper Web page (www.federalreserve.gov/releases/cp/).

paper dealers. TradeWeb states on its Web site that it traded as much as \$675 billion of commercial paper in a single month, carrying listings on more than 2,000 commercial programs, with more than 2,300 daily offerings.

The Secondary Market

A commercial paper trader's primary responsibility is to assist issuers, but she also has a second responsibility, to provide liquidity for investors. Every dealer who sells commercial paper stands ready to buy back paper sold through it. The dealer's bid is the going market rate for paper of that grade and current maturity plus a few basis points. Liquidity is generally not very good in the secondary commercial paper market.

Over time, the dealers had tried to contribute to the liquidity of the secondary market for commercial paper for the obvious reason that it made commercial paper more attractive to investors in general. A less obvious reason is that while the commercial paper market was growing sharply, a drop occurred in the outstandings of other short-term instruments, such as CDs and BAs. Thus, investors who traditionally had bought other types of paper when they wanted to extend became more willing to look at longer-dated commercial paper. Gradually, the commercial paper market changed from being a market in which the buyer typically only wants to hold to maturity to one in which there is an occasional buyer who wants to profit when she sees an opportunity to position longer-maturity commercial paper for a profit. This is small, however, and the secondary market generally consists of investors whose economic situation has changed, requiring the sale of the commercial paper and perhaps other assets.

For their part, the dealers not only will take back commercial paper for as much as a few basis points, but at times, they will go back to investors, bid aggressively to buy back paper, and then trade it. They do that to make money, to provide liquidity to all sectors of the market, and to get a feel for correct pricing in each sector of the market.

Some dealers will position unsold paper for longer than overnight. Said one: "We will buy unsold commercial paper for longer than overnight if the client so desires. Maybe the client has a specific need to a specific date or maybe he fears that rates are rising and does not want to risk meeting higher rates in the market next day. Whenever we position a client's paper, we do so with his knowledge. We are not in the market to trade

against our clients, and we do not want to give the impression of doing so. However, when we take in paper for longer than overnight, that paper is ours to do with as we please—to hold to maturity or to trade. Any paper we buy we will try to sell out, but we try not to put that paper in competition with any other paper that the client might be trying to sell: if I hold 30-day paper of a client and he comes in wanting to sell more in the same area, I try to sell the customer's new paper first. Honestly, however, if it's a bad market, we are going to try to get out of any securities we own."

Different Classes of Issuers

Commercial paper dealers have cultivated new classes of issuers over the years. One of the most prominent of which is the asset-backed issuer.

Multicurrency Commercial Paper

In the late 1980s, with the dollar chronically weak and short-term rates much higher in countries such as Australia and New Zealand than in the United States, a venturesome investor of dollars was tempted to make unhedged investments in foreign-currency-denominated, short-term paper. However, he faced potential hassles and risks: he might have to buy unfamiliar names; he had to deal with foreign settlement practices and foreign custodians; in some countries, he had to pay withholding taxes; and then, he had to worry about country risk.

All this led Goldman to a novel idea: if investing in Aussie-dollar paper in Australia was awkward, why not create and trade *synthetic* Aussie-dollar paper right in New York and the same for paper denominated in numerous other currencies? Goldman dubbed its new product *universal commercial paper (UCP)*. The way it worked was simple: Goldman found U.S. investors who were willing to purchase UCP in a specific foreign currency; a U.S. company then agreed to borrow the U.S. dollar equivalent at a specified rate; two business days later, the investor remitted the foreign currency to the issuer via Goldman; Goldman set up a currency swap with the issuer, who thus had no foreign-exchange risk. At maturity, the issuer paid principal and interest to Goldman in dollars, and the investor was repaid in the foreign currency. Merrill has a synthetic product of its own, simply titled *multicurrency commercial paper (MCP)*.

For the investor, selling multicurrency commercial paper is just like selling U.S. dollar-denominated paper except that the transaction settles with a two-day lag to permit settlement of the foreign-exchange transactions

required at issuance of the paper. UCP had an enthusiastic reception with borrowers who felt it permitted them to shave a few basis points off their cost of funds. Said one, “We’d do rubles, if we could hedge them.” The multicurrency buyer takes a currency risk, but her reward is higher yield and the opportunity for appreciation. One satisfied buyer, a fixed-income manager at a major insurance company, said, “What makes this paper unique is that you can decide which foreign exchange you want to take your risk in, deal with credit risks you’re familiar with, and be paid for that risk—all without foreign custodians.”

Asset-Backed Commercial Paper

Asset-backed commercial paper is paper that is issued by a shell company whose sole purpose is to purchase assets, from one company or many, of a specific type and quality and to then fund these assets by borrowing in the commercial paper market. Usually, the assets purchased are either (1) *trade receivables* or accounts receivable due from buyers of a company’s products (Michelin tires or Mattel toys) or (2) *term receivables* such as auto loans and credit card bills. Both types of financial assets are either liquid or have short maturities, and term receivables generate a return. Their short maturities make them a good fit for the commercial paper market.

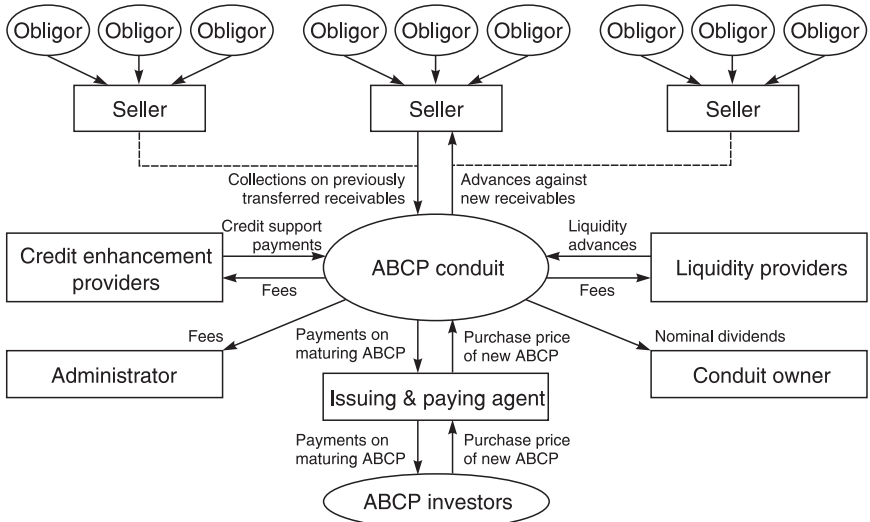
There are five main types of asset-backed commercial paper: general-purpose multiseller, credit arbitrage, structured investment vehicle, single-seller, and loan-backed.⁹ The multiseller program is the largest segment of the asset-backed commercial paper market, consisting mostly of financing for term receivables as well as for securities purchases and asset warehousing.

Figure 22.5 illustrates how a typical asset-backed commercial program works. Basically, a corporation or financial institution issues commercial paper through a special-purpose corporation, which actually plays a limited role in the process, having no employees and minimal capitalization. Instead, most of the operational issues are handled by the administrator of the program, which is generally a commercial bank. As Figure 22.5 shows, there are both credit enhancement and liquidity providers, which are generally provided by high-quality commercial banks.

⁹ Dierdorff, Mary D., “ABCP Market Overview: Spotlight on Changes in Program Credit Enhancement and Growth and Evolution of Securities Arbitrage Programs,” Moody’s Investors Service, *Asset-Backed Commercial Paper Market Review*, Second Quarter 1999.

FIGURE 22.5

A typical asset-backed commercial paper (ABCP) program



Source: Adapted from Moody's, "The Fundamentals of Asset-Backed Commercial Paper," *Special Report*, February 2003, p. 25.

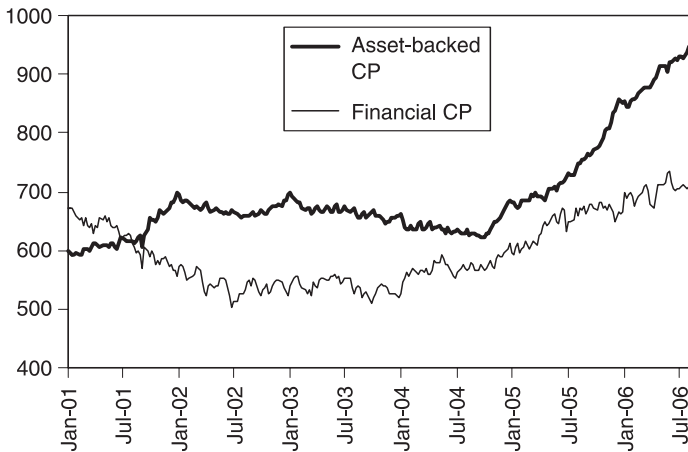
These serve as backups to the cash flows associated with receivables and other cash flows that underlie the issuance of asset-backed commercial paper. The administrator is generally in charge of creating the enhancement facilities.

Credit arbitrage programs are those in which the proceeds of the sale of commercial paper issuance are used to invest in securities portfolios (described below). In such programs, any loss to principal is essentially insured because of liquidity that would be infused by a third party in the event of losses. The third parties cover 100% of the outstanding asset-backed commercial paper that they are linked to, unless the issuer defaults. Credit arbitrage programs differ from *limited purpose investment companies* (LiPICS) and market value asset-backed commercial paper programs, which depend upon the liquidation of assets to repay investors.

The growth of the asset-backed commercial paper market has outpaced the growth of all other segments of the commercial paper market. In September 2006 roughly \$950 billion of asset-backed commercial paper was outstanding, a nearly 60% increase from five years earlier and

FIGURE 22.6

Asset-backed commercial paper outstanding has grown much faster than financial commercial paper outstanding



Source: Federal Reserve

more than half of all commercial paper outstanding. Asset-backed commercial paper issuance has surpassed the issuance of financial paper, which had about \$700 billion outstanding in September 2006. Illustrating the growth of the asset-backed commercial paper market is the fact that it had about the same amount outstanding as the financials did five years earlier (Figure 22.6). One of the major factors behind the growth of the asset-backed commercial paper market is its diversification away from the issuance of term asset-backed securities transactions toward commercial paper issuance. In addition, larger transactions are now facilitated by the market, which has helped it to grow, and a wider variety of issuers have established asset-backed commercial paper programs.

Commercial Paper with a Cap

With the increasing sophistication in the market—interest swaps, caps, collars, and floors—some commercial paper dealers engage in maturity extension programs in which they sell an issuer a cap on the rate it will have to pay over some period. Capped commercial paper is really *two* products: a regular commercial paper trader sells the issuer's paper; a second trader of caps and floors prices and sells the issuer a cap (recall from Chapter 18 that a cap is a series of options).

“We tell the borrower,” said one dealer in capped commercial paper, “that, for an up-front premium of X basis points, we will cap out a certain dollar amount at some rate, Y . The borrower can name his rate, and on the basis of that rate, we calculate the price of the option.” A rate cap looks most attractive to borrowers when it looks as if rates might be moving up and becoming more volatile. “It’s a bit of a shock to issuers,” added the same dealer, “to see the premium that they have to pay out in cash for a cap, but once they understand the idea, it makes sense to many of them to take a look at the product. Everyone has a budget, and a cap permits the issuer to budget the cap rate plus the premium.” The most mysterious calculation for a corporate treasurer contemplating the use of a cap is: Is the cap priced fairly or excessively? Ask the sages of the future.

ARBITRAGE IN THE DOMESTIC COMMERCIAL PAPER MARKET

One thing that distinguishes the commercial paper market today from its sleepier past days is the amount of arbitrage that goes on in the market. We have mentioned several forms such arbitrage takes. There is dollar-to-dollar arbitrage: a foreign bank sells domestic commercial paper to raise dollars and then lays them off in the Eurodollar market at a positive spread. There is also dollar-to-foreign-exchange arbitrage: a foreign borrower, to shave her borrowing costs, sells dollar-denominated commercial paper and then swaps the proceeds into her own currency. Finally, there is the reverse of that arb: a domestic borrower, also to shave her borrowing costs, sells foreign-denominated paper, and then swaps the proceeds into dollars. Arbs of the last two kinds are also done in the European commercial paper market (described below). With all these, the profit potential has shrunk in recent years, as spreads have tightened and pricing information has improved.

As mentioned above, another form of arb that has become more frequently utilized is *credit arbitrage*. It consists of the following: an issuer, say an A-1, P-1 industrial company, uses some portion, small to all, of the proceeds of its sales of commercial paper to invest in higher-yielding paper. In the early 1980s, Kellogg (of cornflakes fame) obtained a no-action letter from the SEC permitting it to sell 3(a)(3) paper for arbitrage purposes. Kellogg began the game; Arco, Atlantic Richfield, and others followed.

At the outset, a double-A issuer could issue its paper, turn around and buy A-2, P-2 paper, and pick up 200 bp. Eventually, however, that

spread fell, and in recent years it has been rather skimpy, often less than $1/8$. One reason was that more commercial paper issuers began to do the arb. Also, years ago a lot of A-2, P-2 issuers had, for rating reasons, to fund themselves out of the commercial paper market; they did this by issuing new long-term debt or equity; and consequently, arb players found themselves investing in a shrinking market.

Now if a commercial paper issuer wants to profit from arbitrage, she must mismatch maturities: issue 3s and invest in 1s because the yield curve is going up or whatever. Obviously, there is risk in this, since the arbitrageur is making a bet that her view on rates is correct. Another ploy open to commercial paper arbitrageurs is to invest in highly speculative paper—taking credit risk.

Today, to sell paper, an issuer must pay the rating agencies, pay issuer and paying-agent fees, and pay the cost of administering her program. All this raises the cost of arbitrage. Also, some people are apt to conclude, “We are in the business, not of arbing commercial paper, but of manufacturing widgets.”

DIRECT ISSUE PAPER

In August 2006, about 17% of all commercial paper outstanding was placed directly with investors, a figure that has steadily declined over the years; in 1990 it was 43%. Firms issuing their paper direct—the number is relatively small compared to the total number of commercial paper issuers—are mostly large finance companies and bank holding companies. Some of these finance companies, such as GMAC, GE Capital, and Ford Motor Credit (FMC), are *captive finance companies* that borrow primarily to finance the credit sales of the parent industrial or retailing company. Others, such as LaSalle Bank and Calyon North, are independent finance companies.

The big directs sell their paper directly to investors to save money by eliminating dealer fees. Direct issuance involves, however, substantial costs. Thus, direct issuance is cost-effective only for a big issuer. One big issuer estimated that its all-in cost of issuance runs 1 bp.

Diversification into Financial Services

One important change in direct issuance over the years has been the expansion, especially by the auto finance companies and/or their parent companies, into other related finance services: mortgage servicing, insurance,

the thrift business, leasing, and so on. The move toward such diversification made sense on a number of counts: the auto companies had strong earnings and could thus finance acquisitions of firms in financial services; the auto business is cyclical and thus produces profits that swing cyclically; diversification into related financial services appeared to offer the auto companies and their finance subs attractive, stable earnings. The diversification has, in recent years, helped to mitigate some of the problems faced by the automobile industry in the early 2000s. Nevertheless, problems in the parent companies have caused GM and Ford to make orderly exits from the commercial paper market.

The auto finance companies are not the only finance companies that diversified into financial services; GE Credit, now called General Electric Capital Corp. (GECC), has also done so and is now the largest direct issuer of commercial paper, with \$55 billion outstanding in August 2006. UBS ranks second at \$44 billion; Citigroup is third with \$26.8 billion; and Société Générale is fourth at \$24 billion.

A number of the financial services firms that the big finance companies acquired already had their own commercial paper programs. Thus, a natural trend for the big finance companies has been, as they diversified, to begin to run a number of independent commercial paper programs—to act rather like a commercial paper dealer. Some run, for example, separate commercial paper programs, including programs for finance, for the parent corporation, for insurance, and for other subsidiaries of the parent.

A related development, one likely to continue, is for a finance company that runs a number of programs for different affiliates to rename itself something like General Electric Capital Services and then to consolidate some or all of its commercial paper issuance: to issue commercial paper in one name for a number of affiliates and to then downstream the money raised to the affiliates for which it is borrowing.

Running a Direct Commercial Paper Operation

While different directs have different setups, a look at how one sells its paper gives a good idea of what's involved. "We have," noted an executive of one big direct, "several traders. Every morning, these traders, I, and my boss meet to chart our overall objectives—What are our cash needs? In what maturities do we want to raise money?—and to set our initial rates. After 9 a.m., our traders, who follow developments in all markets,

have total responsibility for making any rate changes required during the rest of the day. We have 15 clerical people, mostly part time, and 10 salespeople who call out rate changes to customers, take transactions, and see that settlement occurs—that notes get delivered and all that. The difference between our clerical people and our salespeople is that the latter, besides having responsibilities in the office, are also responsible for visiting existing customers and for developing new customer relationships. We divide the United States into six regions; in each, we have an office with a manager, at least one salesperson, and several clerical people. Since a salesperson's responsibility is to do as much business as she can in her geographic area, it's unwise to let salespeople set rates; we permit only our traders to do that."

While directs have their salespeople call customers to give them their posted rates and any changes in them, they also post their rates on Bloomberg and Reuters. Some big directs also post their rates with bank money desks. When banks were forbidden by Glass-Steagall from acting as dealers in commercial paper, they could and did post rates for direct issuers and arrange sales of such paper to investors. The banks did this partly so that they could offer their clients a full menu of money market instruments; also, direct issuers typically purchase large backup lines from banks that post their paper rates. It still occurs that some directs sell a portion of their paper through banks, but the volume of paper sold this way is far less than it was formerly, especially in the New York area. Now that banks are permitted to deal in commercial paper, banks that do so have a natural incentive to sell first the paper on which they get a fee.

Some direct issuers, especially those who are just entering the market, will break rates for a large investor if they want money. Others won't. "We do," said an established issuer, "little of that. It happens once in a while, usually on what we call a *reverse inquiry*. Say we don't want much, if any, 90-day money today. We may have a customer call who says, 'I need to put \$200 million away; it must be for 90 days; and your quote is off the market.' Say we are quoting 4½ at 90 days, and the market is slightly higher. The guy might say, 'If you can show me the market rate, I will give you the money.' Chances are we would do that. I view that as being attentive to a customer's needs. However, if we are quoting a market rate and someone comes in and tries to hold us up for a little more, we will never break rates. Our traders are paid to know where the market is, so we are sticky about that."

Prepayments

The big direct issuers of commercial paper will all prepay on paper they have issued if the investor needs money before the paper she has purchased matures. Some issuers do this at no penalty. Others will give the investor who requests prepayment the rate that she would have gotten on the day she purchased her paper if she had brought paper for the period she actually held it. The no-penalty system would seem to invite abuse—to encourage investors to buy, whenever the yield curve is upward sloping, paper of a longer maturity than that for which they intend to invest in order to get a higher rate. Issuers, however, figured that game out quickly and don't let an investor get away with it for long.

One reason issuers are so willing to prepay is that most do not want investors to sell their paper to a dealer for fear that the dealer's later resale of that paper might interfere with their own sales. Still, a few of the largest issuers will occasionally sell longer-term paper to dealers who position it for carry profits and as a speculation.

Master Notes

Bank trust departments have many small sums to invest short term. To provide them with a convenient way to do so, the major direct issuers of commercial paper offer bank trust departments what are called *master notes*. A master note is a variable-rate demand note on which the issuer typically pays the rate she is posting for 180-day money, that rate plus as much as an $\frac{1}{8}$, or some similar formula rate.

A bank trust department with whom an issuer has opened a master note invests monies from various trust accounts in it. Then, each day, the bank advises the issuer what change, if any, has occurred in the total amount invested in the note. From a trust department's point of view, a master note provides such a convenient way for investing small sums to any date that it typically keeps the balance in any note issued to it close to the limit imposed by the issuer on the size of the note; daily variations in the size of a large master note—say, one for \$25 million—might be no more than \$100,000.

For the issuer, master notes provide a dependable source of funds and reduce bookkeeping costs. Money obtained through a master note, however, is expensive for the issuer because the rate paid is based on the 180-day rate; most issuers limit the number of master notes they issue.

A and B Notes

Because bank trust departments keep master notes filled up most of the time, some direct issuers said to them, “Look, you have a master note for \$X million, and most of the time you have it 90% full. Let’s call the top half of that note an *A note*; you can take money out of it on demand. The bottom half of the note we will call a *B note*; on that part you have to give us a 13-month notice to withdraw funds.”

The advantage to the issuer of this arrangement, which is common among direct issuers, is that the issuer gets cheap money that it can record on its balance sheet as *long-term* debt. From the trust department’s point of view, the arrangement provides a high rate on what is really short-term money because different monies are constantly being shifted into and out of the overall note. Issuers of B notes take the position that such debt is not commercial paper but rather a private placement. Still, such debt is recorded in money market statistics as commercial paper.

Despite the appeal of master notes, some question why a bank trust department would invest in a master note rather than an institutional money fund. After all, an institutional money fund offers a bank trust department the same convenient subaccounting that a master note does and a comparable yield. In addition, an institutional money fund has the advantage over a master note in that it offers, instead of exposure to a single credit risk, *diversity of credit risk*. Nevertheless, bank trust departments continue to be attracted to master notes.

Laying Off Money

It is difficult for the big direct issuers to borrow on a given day precisely the amount of money they need. Typically they borrow slightly more; and at times, if they are not quick in cutting rates, they may be hit with a lot of unwanted funds because rates elsewhere in the market are falling. Direct issuers all run a short-term portfolio to lay off excess funds. Their investments include a wide range of money market instruments and are made with varying degrees of sophistication.

Because they can borrow short term at very low rates, the big directs with prime names could arbitrage—buy short-term money in the commercial paper market and lay it off at a positive spread elsewhere. Most do not do so, however, out of concern for the aesthetics of their balance sheet. One individual responsible for investing excess funds raised by a large direct issuer observed, “We would not take on money to lay it off at

a profit. But as a matter of policy we stood on a posted rate, and sometimes we got hosed with excess money. Then we'd lay that off. I wanted to look at it differently: We can raise money and lay it off and make some money. But management wanted the ratios of the credit company to conform to what people analyzing the company's credit wanted. Maybe they were overly conservative, but we never borrowed as an arbitrage."

MTNs (MEDIUM-TERM NOTES)

Direct issuers of commercial paper are typically also big issuers of MTNs (Chapter 24). Directs can and do sell some of their MTNs directly to investors, but usually such sales amount to only a small percentage of their total sales of MTNs. Like other issuers of MTNs, direct issuers of commercial paper sell most of their MTNs through dealers, who for their part commit to make an active secondary market in such paper.

With respect to the MTN market, one big direct commented, "We like the MTN market, and we participate in it a lot. We arb that instrument versus a public offering. Any time we get a debt deal offered to us by an underwriter—some dealer says, 'We can do \$100 million for you for five years (swaps, options, and all that junk), and this is the all-in rate,' I go to the MTN market and ask what it would cost us to issue 5-year debt there. If it's cheaper to do MTNs, we tell the dealer to get lost. If it's not, we tell the dealer, 'Hey, we'll do it.' For us, MTNs are a good benchmark."

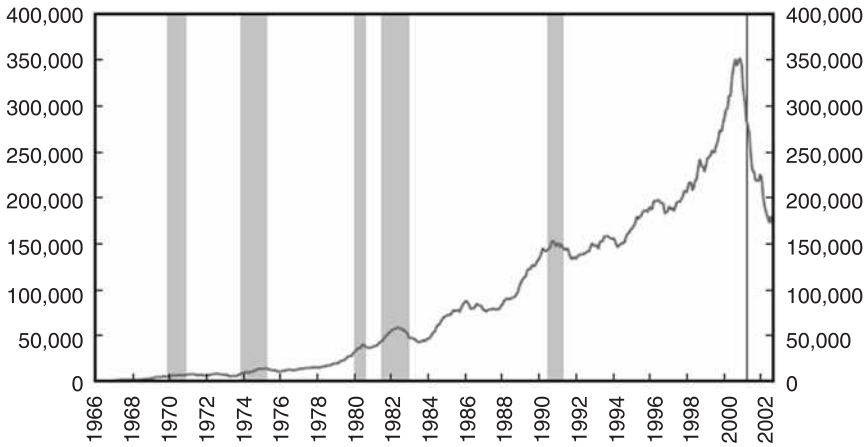
COMMERCIAL PAPER AS AN ECONOMIC INDICATOR

Fluctuations in the aggregate amount of commercial paper issuance can be used as a barometer of the U.S. economy. This is because, as we said earlier, SEC rules require that proceeds of the issuance of commercial paper be used for transaction purposes, meaning that any changes in the amount outstanding should in theory have an impact on economic activity. Historically, however, changes in the amount of commercial paper outstanding have been a coincident indicator at best, with outstandings tending to decline only when the economy was well into recession (Shen, 2003).

Figures 22.7 and 22.8 show this. Nevertheless, it's intriguing to see that commercial paper issuance began to fall *before* the 2001 recession.

FIGURE 22.7

Volume of nonfinancial commercial paper outstanding
(in millions of dollars)

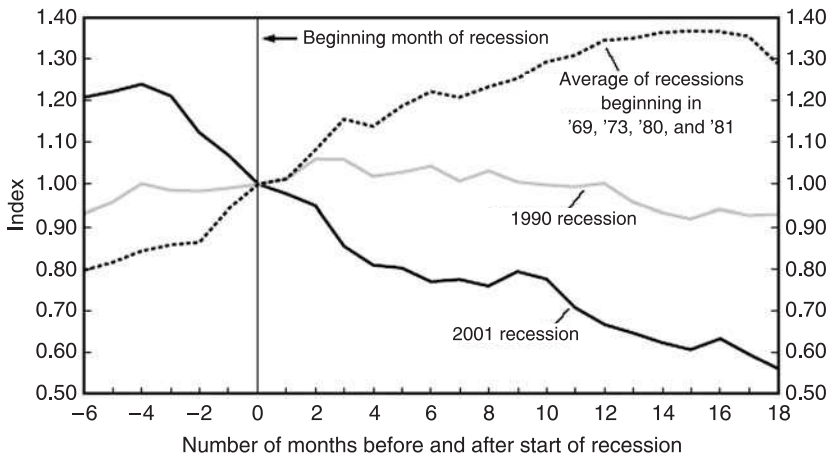


Note: Shaded bars indicate recessionary periods as defined by the NBER Business Cycle Dating Committee. For the 2001 recession, only the start date is indicated.

Sources: NBER, Depository Trust Company, Federal Reserve

FIGURE 22.8

Normalized commercial paper volume around the start of
recessions



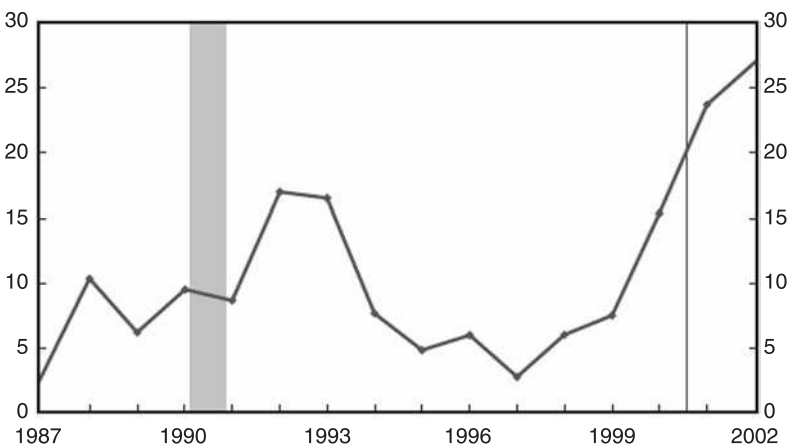
Sources: NBER, Depository Trust Company, Federal Reserve

The decline could well reflect the fact that businesses have become more responsive to changes in the business climate, adjusting their production schedules virtually in real time when they occur. Nevertheless, Shen (2003) argues that a variety of supply and demand factors combined to produce the unusual event. For example, the supply of funding was probably reduced because of the extraordinary preference for only very high-quality commercial paper that has virtually no chance of defaulting. Just prior to the 2001 recession, there was widespread deterioration in the credit quality of firms, partly resulting from the bursting of the financial bubble. This likely reduced the confidence levels among commercial paper investors. The collapse of the telecommunications industry played a role in this respect. Figure 22.9 illustrates the deterioration in perceived credit quality that occurred prior to the 2001 recession, with the number of rating downgrades far exceeding the number of rating upgrades.

Factors reducing the demand for credit included a sharp decline in business inventories and a shift to long-term borrowing. The decline in business inventories and the reduction in short-term borrowing that

FIGURE 22.9

Nonfinancial commercial paper downgrade/upgrade ratio



Note: Data for 2002 are through May 2002. Only first rated A-1+/A-2 either before or after the rating change are included. Shaded bars indicate recessionary periods. For the 2001 recession, only the start date is shown.

Sources: NBER, Standard & Poor's, Federal Reserve

resulted were different from what had happened in past cycles, likely because of the secular desire to maintain lean inventories and because technological advances helped businesses to respond more quickly to changes in demand for their goods and or services.

The second factor that reduced demand for short-term credit beginning in 2001 was a shift to longer-term borrowing. Treasury yields fell to their lowest level since the early 1960s after the Fed cut the fed funds rate numerous times between 2001 and 2003, lowering the funds rate to 1.0%, its lowest level since 1958. Many businesses decided to “lock in” the low rates by borrowing longer term. This reduced the demand for short-term credit.

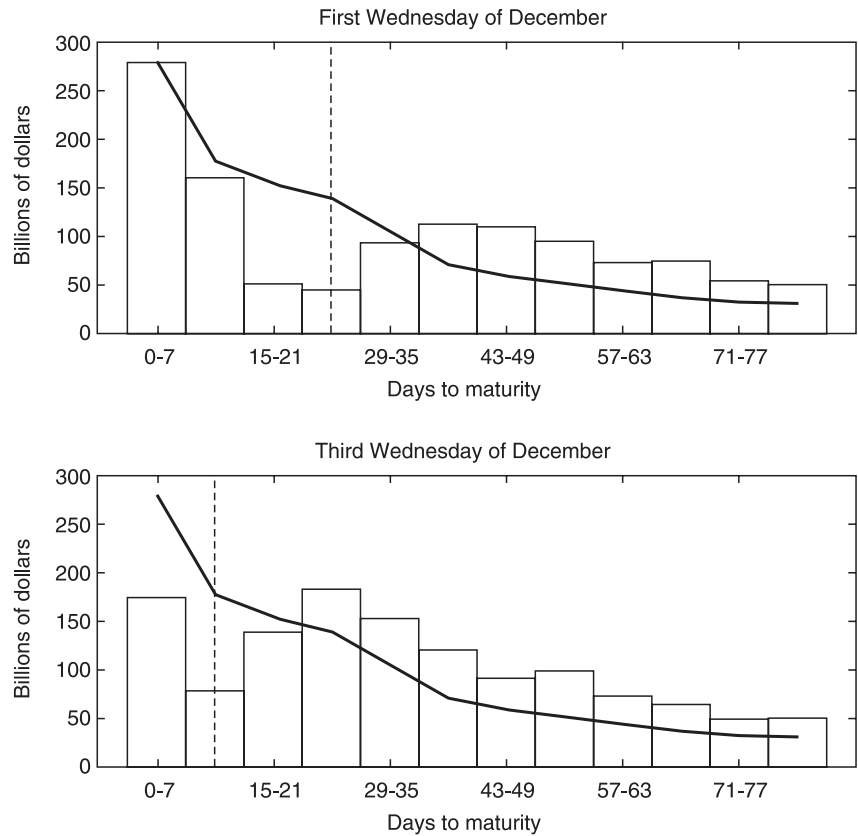
Given the experience of the early 2000s, which was actually a continuation of a trend begun around the time of the recession of 1990, the commercial paper market can now be looked at as a new tool that investors, traders, and analysts can use as a predictor, or a coincident indicator at worst, of the direction of the U.S. economy.

RATE BIAS AT YEAR-END FOR COMMERCIAL PAPER

The amount of commercial paper that matures at year-end tends to fall sharply (Downing and Oliner, 2004). Figure 22.10 shows this. The charts illustrate the sharp increase that occurs between the maturities of outstanding commercial paper in early December and later in the month. With fewer issues maturing at the end of December, liquidity in the commercial paper market falls sharply at year-end, making it necessary for issuers to offer a yield premium to entice investors to buy their paper. There are two explanations in particular why the amount of commercial paper maturing around year-end tends to decline relative to other time periods. First, many issuers tend to engage in window dressing of their portfolios, which entails a switch to the highest-quality instruments, including U.S. Treasuries, for example. In such an environment, lower-quality issuers of commercial paper have an incentive to turn to other forms of finance. Second, interest rates at year-end are often volatile, reflecting numerous crosscurrents including the window dressing and seasonal factors such as fluctuations in the demand for money associated with the holiday shopping season and other factors. This could prompt issuers to issue longer-dated paper in order to have more certainty about their financing rates.

FIGURE 22.10

Average amount of nonfinancial and financial commercial paper outstanding scheduled to mature in the indicated date ranges. The dotted vertical line represents the approximate location of December 31. The solid line reflects the average maturity structure over all other Wednesdays.



Source: Federal Reserve, based on data from the Depository Trust Company

FOREIGN-DENOMINATED COMMERCIAL PAPER

Many of the big domestic finance companies have foreign operations that they finance partly with commercial paper. Also, some U.S. industrial firms operating abroad issue commercial paper.

Big directs, especially those that have branched out into related financial services, may find themselves selling foreign-denominated paper

as well: Aussi-dollar commercial paper, sterling commercial paper, Eurocurrency commercial paper, and so on. Also, because of dealer-arranged swaps, some of the paper they sell in London, while it yields U.S.-dollar proceeds, is denominated in various other currencies.

EURO COMMERCIAL PAPER

Beginning in the mid-1960s, when exports of capital from the United States were restricted by taxes and other measures, several corporations began to issue dollar-denominated commercial paper through U.S. dealers in London. The market for Europaper (as we explain later, by “Euro” paper we are referring to commercial paper sold outside of a particular country but in the currency of the home country), which offered investors an opportunity to diversify out of Eurodollar time deposits, started small, but showed signs of promise. By the early 1970s, this market had grown to \$100 million in outstandings; then, in 1974, the United States eliminated the interest equalization tax and related measures. Again, it became cheaper for corporations to borrow in the United States, and the market for Europaper died. In the 1980s, it was born again not because of divine intervention but because of vastly changed economic circumstances plus some Darwinian-like evolution. By the early 2000s, the Euro commercial paper (ECP) market had become a multicurrency market, with issuers able to tap into demand for paper denominated in sterling, Swiss francs, yen, the euro, and other currencies, giving them greater flexibility to shop around the globe for the best possible rates.

Evolution: Syndicated Loans to ECP

Darwin wrote of animals and plants. Money market instruments too are subject to evolution: Which instruments evolve and survive depend on what’s viable, which in turn depends on economic circumstances, which can be counted to do, with certainty, only one thing—change constantly. In 1978, when the first edition of this book was published, domestic bank CDs appeared to be a permanent feature of the money market, a survivor; so too were Euro syndicated loans. Both are now far less robust than they once were considering the growth in other financing tools.

Euro commercial paper, which after the advent of the euro currency in 1999 became a label in need of an asterisk, refers not to issues denominated in the euro currency, but to commercial paper sold externally.

This could refer to a U.S. issuer selling in Europe or Canada or a Japanese issuer selling in Europe, where most Euro commercial paper is sold.

HISTORY OF THE EURO COMMERCIAL PAPER MARKET

Euro commercial paper evolved out of the securitization of bank-syndicated lending. In the late 1970s and early 1980s, investors considered the top 10 American banks to be the finest credits; the spread between U.S. and Euro rates was wide; and top American banks could issue Euro CDs at a significant saving to LIBID. A big change occurred post-August 1982, when the Mexican debt crisis hit. Investors became concerned about the credits of U.S. money center and other banks that had Latin American and other less-developed-country (LDC) debt on their balance sheets. Nothing that has occurred since has eased investors' concerns about bank credits.

When banks were regarded as the highest-quality credits, syndicated lending thrived because it was easy for banks to build in a spread. However, as investors altered their appraisal of credits, they turned away from bank paper and opted to buy more sovereign and corporate paper. Gradually, sovereigns and corporates found that they could achieve finer and finer borrowing rates, rates that rivaled those that banks could achieve. This in turn eroded the natural spread in bank-syndicated lending and set the stage for disintermediation of such lending. A second contributing factor was the pressure banks were feeling, at the time, to reduce their leverage by getting low-margin business off their balance sheets.

NIFs and RUFs

In the early 1980s, dealers, Merrill in the lead, saw an opportunity. Under a *note issuance facility (NIF)* or a *revolving underwriting facility (RUF)*—these amount to the same thing—a borrower could strike a deal with its banks under which it would issue 3- or 6-month notes and place them via an agent or agents; if the agent failed to place all the notes that the borrower wanted to sell, the banks that had granted the RUF or NIF would underwrite the unsold notes at a formula cap rate. A RUF or a NIF is a committed, medium-term (3-, 5-, 7-year) bank line with a built-in, note-issuance mechanism. Borrowers issuing notes under a RUF or a NIF could commonly do so at as much as half a point below the rate they would have had to pay for a syndicated loan. Economic conditions favored disintermediation.

Firms such as Merrill and Credit Suisse First Boston (CSFB) had a global infrastructure for distribution—contacts with buyers of floating-rate notes, CDs, and other paper. So it was a natural for them to distribute the paper issued under RUFs and NIFs. This paper was a CD if the borrower was a bank, a *Euronote* if the borrower was some other entity. Initially, the banks that underwrote NIFs and RUFs were principally interested in facility fees, not in distributing paper, particularly because they did not know where to sell it. Meanwhile, Merrill and CSFB began to call around to more and more institutions with a view to getting them to invest in Euronotes. A lot of the buyers they found turned out to be commercial banks. This woke up the banks writing NIFs and RUFs; they thought, “Why don’t we get involved in selling Euronotes? It seems to be a profitable business.” Little did they guess that the investment bankers in the business were at the time making not $\frac{1}{8}$ or even $\frac{1}{16}$, but more like 3 or 4 bp, and they were beginning to depend very much on volume.

In any case, it came to pass that a lot of commercial banks tried to get into the distribution of Euronotes—they were earning something on the lines and wanted to earn something more on distribution. Consequently, some banks would say, “If we grant part of the line, we want part of the paper issued under it to sell.” One way Euronotes were distributed to banks was via *tender panels*. A would-be note issuer would agree with its line banks to submit notes it wanted to issue to them for bids; in doing so, the issuer knew that the worst that could happen would be that it would have to pay the formula cap rate incorporated in her RUF or NIF. The Kingdom of Sweden was a classic example of a user of the tender panel. It would announce, “Next Wednesday, we want our tender panel members [which were 40 banks] to bid for our 6-month paper. The auction is next Wednesday. You will hear Wednesday afternoon what paper you bought. The paper settles the following Monday. We are going to show \$100 million.” The banks would give their bids, the best of which would be hit. In a functional sense, the tender panel was like Sweden’s Euro primary dealers.

For an issuer, tender panels presented certain problems. The banks bidding never knew if or how much paper they would get, so they could not make firm commitments to investors wanting to buy paper. Also, some tender panel members lacked distribution capability, and sometimes, they would end up dumping an issuer’s paper in the secondary market at rates below what they had paid for it. Finally, the tender panel approach forced the issuer to wait not two days, but as much as a week before she got her money; and it locked her into 3- or 6-month maturities.

Enter Euro commercial paper. As time passed, top-quality issuers began to say, “Hey, the market for Euronotes is growing and here to stay. We no longer need to issue our paper under the umbrella of a NIF or RUF with a built-in, bank-underwriting mechanism. Instead, we will use agent dealers and do a *tap offering* [a continuous offering with different rates posted for different maturities].” The dealers said, “Fine, we will call that Euro commercial paper.”

Legally, Euronotes and Euro commercial paper are the same thing: unsecured, short-term paper. Issuers that use Euro commercial paper prefer it to Euronotes because they can back all or some portion of their paper issuance with general revolving lines of credit. There’s a small cost saving in this, but not much. More important, Euro commercial paper gives the issuer greater flexibility—it can post attractive rates at the maturities it finds most attractive. Also, the issuer has more control over the rates it pays. Finally, an issuer can custom-tailor maturities to fit an investor’s need: give her paper maturing in two months and seven days if that’s what she wants.

Today, the Euro commercial paper market remains fast-growing, with issuers increasingly comfortable raising capital abroad if it best fits their operational and financial needs. Data from the Bank for International Settlements show that at the end of March 2006 there was \$537 billion of Euro commercial paper outstanding, with \$247 billion of that total denominated in euros, \$143 billion denominated in dollars, and \$109 billion denominated in sterling.¹⁰ Only \$4.1 billion of the total was denominated in yen. The vast majority of the total outstanding was issued by financial institutions, which had issued \$474 billion of paper, followed by corporate issuers, with \$43.6 billion outstanding.

Dealers in ECP

Since there is not now and never was a Glass-Steagall Act in the United Kingdom, the top dealers in Euro commercial paper are a combination of commercial and investment banks: Barclays Bank, Citi, Commerzbank, Credit Lyonnais, Credit Suisse First Boston, Deutsche Bank, Dresdner Bank, Goldman, ING Barings, JPMorgan, Lehman, Morgan Stanley, among others. Many of the top dealers post offerings on the Internet via online marketplaces such as TradeWeb, which shows the Euro commercial paper offerings of 11 dealers. With TradeWeb, investors can trade Euro

¹⁰ Taken from page A-90 of the Bank for International Settlements’ *Quarterly Review*, June 2006.

commercial paper in under 10 seconds, having access to more than 12,000 offerings each day.

The nonbank dealers got into the market because it was a natural extension of their business in the U.S. commercial paper market. If there was going to be a Euro commercial paper market, the top dealers regarded themselves, with their global distribution networks, as a natural choice of agent by issuers. Commercial banks had their own motives for getting into the market, as they saw that unless they maintained a relationship with a borrower in the Euro commercial paper market, they could be walking away from a lot of other business, including other types of loans. They did not want to do this, so begrudgingly they took on Euro commercial paper business. The fall of Glass-Steagall hastened their entry into the market. Banks saw that they had strong global corporate relationships and that corporates were strong buyers of the debt of other corporates; so for banks it was a matter of edging corporates away from the interbank deposit market and into other people's commercial paper.

Dealers are vital to the Euro commercial paper market, where direct issuance remains in its infancy.

Investors in ECP

The market in Euronotes and later in Euro commercial paper started out without anyone having much idea of who the investors were going to be. Initially, the market was borrower- or supply-driven, and to a large extent, it still is. Investors never lined up to buy the paper, whereas borrowers were lining up to issue it.

Buyers of Euro commercial paper turned out to be pretty much who one would have expected them to be: corporations outside the United States, some money funds and investment advisors, central banks, banks, and pension funds. Product propinquity, which presumably leads to familiarity and ease of clearing, appears important as a large portion of Euro commercial paper is sold in the United Kingdom.

Euro commercial paper is not commonly sold to U.S.-based investors for several reasons. First, a lot of Yankee issuers also have programs in the U.S. commercial paper market, where liquidity is greater. Second, there are potential withholding tax problems. Third, the SEC does not want the paper sold in the United States unless it is registered. In Europe, commercial paper is issued under the Reg. S exemption of the Securities and Exchange Act of 1933, prohibiting the sale or offer of securities to U.S. persons. Offshore U.S. entities, such as foreign subsidiaries of

U.S. companies, can and do, however, buy Euro commercial paper. Thus, for a large U.S. corporation that runs a globalized treasury (recall Chapter 11), the inability of the parent to buy Euro commercial paper may not be a binding constraint: by buying Euro commercial paper via its foreign subs, the company may be able to fully sate its appetite for such paper.

NON-U.S. COMMERCIAL PAPER MARKETS

Over time, the U.S. markets have proved to be the most efficient and resilient markets around. Thus, it is unsurprising that other countries have copied U.S. markets. This occurred in Treasuries, and it has also occurred in commercial paper. Still, despite the existence for many years of commercial paper markets in the United Kingdom, Sweden, France, and Australia, the foreign commercial paper markets all ape in large degree the long-established U.S. commercial paper market.

Because of the global currency mix that now exists, given the various national markets in which commercial paper is issued and the various currencies in which Euro commercial paper is denominated, any investor or issuer can now start in any one of a number of currencies and get back, via a swap, to her own currency if she wants to. Dealers see this as an opportunity to generate business.

Some firms, for example, have an arbitrage program that hunts for anomalies in foreign-exchange spot and forward rates. The moment a dollar asset yields a fully hedged investor of Euros more than LIBID, their European desk will start calling European corporates looking for one that wants a better return than interbank. “At times,” noted one dealer, “we have been able to turn dollar-LIBID paper into euro-LIBOR paper. We have done deals with a 2- or 3-bp advantage in them for both the issuer and the investor: the currency that the issuer wanted was sterling, the currency that the investor had was the euro, and the currency in which the paper was issued was dollars. That is a truly global commercial paper market.”

European Commercial Paper

The advent of the euro in 1999 paved the way for growth in the European fixed-income market, which for many years had been hampered by not only the many different currencies that existed, but also by differences in the standards and practices governing the markets there. The slow growth of the European commercial paper market can be traced to the

segmentation in the European markets, although significant progress has been made that should help them to grow faster in the years ahead.

European policy makers have been cognizant of the factors restraining the growth of the European commercial paper market. This was evident in a speech delivered by European Central Bank President Jean-Claude Trichet in November 2005, who discussed a key initiative expected to boost the growth of the European commercial paper market:

Compared with the equivalent U.S. commercial paper market, which has an outstanding amount of around EUR 1.3 trillion and which is indeed integrated, the aggregate size of the commercial paper and certificates of deposit markets in Europe is around EUR 0.8 trillion. Furthermore, these markets remain segmented within Europe. Here, I expect that the *Short-Term European Paper (STEP)* initiative, which aims to promote the convergence of standards and practices, will provide an impulse towards integration, thereby increasing the depth and liquidity of this market in Europe.¹¹

One example of a barrier faced by the European commercial paper market is the large number of central securities depositories (CSDs) that clear the commercial paper transactions that occur there. In contrast, the United States has just one CSD, the Depository Trust Clearing Corporation (DTCC), which clears and settles about 95% of all commercial paper trades in the United States.

The STEP initiative seeks to integrate the European markets by adopting market standards and practices that have greater uniformity. For example, standard documentation and settlement procedures will be formulated. Key promoters of the STEP initiative include the European Banking Federation and the big brokerage houses in Europe. The STEP initiative grants a “STEP label” to acceptable standards and practices that are deemed STEP-compliant.

REVIEW IN BRIEF

- The commercial paper market is one of the largest sources of funds in the money market and the money market’s single largest financial instrument.

¹¹ Notes taken from the European Central Bank’s Web site (www.ecb.int/press/key/date/2005/html/sp051128.en.html) from a speech delivered by European Central Bank President Jean-Claude Trichet at the Third Euro Fixed Income Forum of the Euromoney Conferences held in Paris, France, on November 28, 2005.

- Commercial paper is an unsecured promissory note with a fixed maturity of no greater than 270 days. As with T-bills, commercial paper rates are quoted on a discount basis, and most offerings generally have minimum denominations of at least \$100,000.
- Money funds and mutual funds are the single biggest class of investors in commercial paper, holding over half of all commercial paper outstanding in 2006. Ranking second are funding corporations.
- Most commercial paper is paid off via funds generated by the sale of new paper. With commercial paper rolling over frequently, nearly all issuers back their outstanding paper with bank lines of credit to provide emergency funding in case of a liquidity crisis. The minimum backup facility is typically 75% of the total size of the issuance.
- Defaults are very rare in the commercial paper market, with only a handful of defaults occurring over the past 30 years.
- Investors in the commercial paper market have very little appetite for low-grade credit issuers; issuers whose credit rating deteriorates are these days forced to make an orderly exit from the market.
- Most commercial paper is considered 3(a)(3) paper, which is the section of the Securities Act of 1933 that exempts from registration paper that is used to finance “current transactions,” so long as the paper has a maturity of 270 days or less.
- A small number of firms borrow in the commercial paper market by issuing *letter of credit (LOC)* paper.
- Dealer issuance of commercial paper has grown more rapidly than has direct issuance paper, which accounts for just under 20% of all commercial paper outstanding.
- The secondary market for commercial paper is very small.
- *Asset-backed commercial paper* is paper that is issued by a shell company whose sole purpose is to purchase assets, from one company or many, of a specific type and quality and to then fund these assets by borrowing in the commercial paper market. The assets purchased are usually either trade receivables or term receivables.
- In August 2006, about 17% of all commercial paper outstanding was placed directly with investors, a figure that has steadily

declined over the years. The big directs sell their paper directly to investors to save money by eliminating dealer fees.

- Fluctuations in the aggregate amount of commercial paper issuance can be used as a barometer of the U.S. economy.
- Many of the big domestic finance companies also have foreign operations that they finance partly with commercial paper. Also, some U.S. industrial firms operating abroad issue commercial paper.
- *Euro commercial paper* refers not to issues denominated in the euro currency but to commercial paper sold externally, outside of a home country, typically in the home country's currency. Today, the Euro commercial paper market is fast-growing, with issuers increasingly comfortable raising capital abroad if it best fits their operational and financial needs.
- The advent of the euro in 1999 paved the way for growth in the European commercial paper market, and progress is being made to reduce the segmentation that had hampered growth in the past.

Bank Sales of Loan Participations

In old-style banking, the buzzword was *lending*; in new-style banking, the buzzword is *distribution*. The selling by banks of loan participations is one manifestation of their commitment to evolve out of old-style banking into new-style banking. For banks, one natural product is to create and distribute loans. The distribution of loans serves two particular purposes: banks wanting to lend more can expand their loan portfolios by purchasing loans and banks wanting to diversify their portfolio risks can sell loan participations. The strategy that underlies the banking sector's selling of loan participations is the same as the one that has led to the widespread use of derivatives products, a market that grew dramatically during the 1990s, but which probably slowed the growth of the loan sale market.

While the motivation for selling loan participations hasn't changed all that dramatically over the years, the composition of buyers has changed a great deal. Whereas the vast majority of participations were once sold from one bank to another, these days the mutual fund industry also has a major presence in the market.

SOME HISTORY

Up to the mid-1960s, banks were happy lenders. In those good, bygone days, banks had a large share of the market for corporate external financing. Banks lent to their commercial and industrial (C&I) clients at prime, often at prime plus a spread. In addition, banks required borrowers to keep substantial compensating balances of demand deposits with them. In this

environment, banks were able to earn fat, net-interest margins on their principal business—lending.

Over time, several factors disturbed the comfortable position in which banks had been operating. One was *securitization*. Entities that traditionally had borrowed from banks found that they could borrow at cheaper rates by selling their own IOUs directly to cash-rich investors. The sale by former bank borrowers of commercial paper, a trend that developed swiftly from the early 1960s on, was the first wave of disintermediation, induced by securitization, to wash away a part of the banks' traditional lending base. Securitization has been particularly prevalent in the mortgage market, where there was roughly \$6.2 trillion in mortgage-related securities outstanding as of June 2006 compared to \$9.3 trillion in home mortgages outstanding. Subsequent to this first wave of disintermediation and the securitization trend that induced it, and thanks in part to the trend seen both domestically and worldwide toward deregulation—a trend that made capital markets freer and securities issuance ever easier—other waves of disintermediation followed, each wave further eroding the banks' lending base.

As the years passed, former bank borrowers found a whole array of different IOUs that investors were willing to buy from them at attractive rates: Eurobonds, Euronotes, domestic medium-term notes (MTNs) in umpteen flavors (plain vanilla to peanut crunch), Eurodollar MTNs, Eurodollar commercial paper, and so on. Beginning a little over 20 years ago, the growth of the swap market expanded by a large multiple the options open to a would-be raiser of funds. Often, with swaps, a borrower could cut his funding costs by first selling securities to get one sort of money and then swapping, on attractive terms, that money into money of another sort: he could borrow fixed and swap to floating, borrow in a foreign currency and swap back into dollars—the possibilities became endless, resulting in massive growth of the swap market, which had close to \$200 trillion in interest rate and currency swaps outstanding at the end of 2005, according to the Bank for International Settlements.

The changes we describe were clearly structural, not temporary. Once the genie of securitization was let out of its bottle, no one or no force was going to squeeze it back in and cork it firmly there, as the growth of the swaps and mortgage market illustrates.

To add insult to injury, a number of the problems that one or all money center banks experienced from the early 1980s on began to cast a cloud over bank credits, obviously a far thicker cloud for some bank

credits than for others. In any case, the upshot was that certain borrowers, top sovereigns like the Kingdom of Sweden and other triple-A (nonfinancial) credits, found they could borrow funds as cheaply or more cheaply than could banks themselves.

All this put the banks in an unpleasant position. If they could lend at all to a good credit, it was at a razor-thin margin, one that might not even cover their full costs. While this phenomenon may have hit first in the domestic market, eventually, it also caused a sharp decline in syndicated Eurobank loans—a once attractive bread-and-butter, even caviar, business for the banks.

At first, the money center banks responded by increasing their leverage: they tried to increase earnings by making a slightly lower return on assets (ROA) on a lot more assets. For a time, that permitted these banks to maintain their return on equity (ROE) despite the unfavorable climate for banking. However, by 1980, the average capital-asset ratio at top New York banks was approaching the unheard of level of 30; at that point, regulatory and market pressure dictated a reversal.

Banks had to find a way of shrinking their assets without shrinking their earnings. One alternative always open to them was to make more loans to sub-investment-grade credits. The numerous new routes to disintermediation presented far fewer attractive opportunities to poor credits than to top credits, since nonbank buyers of corporate IOUs are by and large extremely credit-conscious. However, the last thing the big banks needed was to further degrade the quality of their loan portfolios: to add loans of sub-investment-grade credits to their already heavy holdings of questionable loans, less developed country (LDC) and other.

Wholesale banking was a bankrupt business, but investment bankers who were in a business that overlapped in many respects traditional bank activities were on average doing quite nicely: in good years, the largest of them were, on average, attaining twice the steady 15% ROE that the biggest of the money center banks were, on average, able to hit. Hence, money center banks made the strategic decision to evolve out of old-style banking and into investment banking.

Distribution of Loans: An Appropriate Tactic

One big part of investment banking is distribution. Banks had been dealing in and distributing exempt securities for years. Thus, quite naturally, the idea occurred to them that one step they could take to become more like

investment bankers would be to get out of their old make-a-loan-and-hold-it business into a new business, namely, the make-a-loan-and-distribute-it business.

If such loans could be made at a low cost and sold at a reasonable spread, this switch in businesses would help banks to simultaneously both lower their assets and raise their ROEs—just what they, the regulators, and the market wanted.

Loan sales promised to produce what amounted to *fee income* even if some banks chose to book it as net interest income as it accrued over time. Fee income is a big element in the earnings of investment banking firms, and in recent years it has been a key focal point for the banking industry. It is notable, for example, that of \$38.1 billion in net income reported by insured commercial banks and savings institutions during the second quarter of 2006, servicing fees accounted for \$1.4 billion of that income, a whopping 46% increase versus the previous quarter and an amount larger than the industry's income gain for the quarter (\$1.2 billion). Fee income that grew during that quarter came as a result of an increase in the value of servicing assets. Given the preference for and the success in growing fee income, loan sales are an appropriate tactic for the banking industry's strategy of evolving in the direction of investment banking and in boosting fee income.

Distribution of Loans: A Natural Evolution

The making and distributing of loans is a natural for money center banks. Such banks have long-standing relationships with a wide range of corporate and other potential borrowers, often multifaceted relationships: as a lender, as a source of lines, as a supplier of the various exempt securities in which banks may deal, as a source of foreign exchange, as an advisor on strategies for the use of exotic instruments such as options and swaps, as a supplier of leveraged leases, as an advisor on mergers and acquisitions and on leveraged buyouts (LBOs), and as a provider of various other banking services.

On the flip side, money center banks have a wide range of contacts with investors: through their sales forces, they have for years been selling investors bank products (BAs, CDs, institutional money market funds, and bank deposit notes), various exempt securities, and some privately placed securities, and, for a fee, investment management. Also, offshore, where the Glass-Steagall Act did not apply, money center banks have for decades

been active in investment banking as underwriters and distributors of a wide range of securities such as Euromarket paper, but also of securities originating in foreign capital markets and denominated in the currencies native to those markets.

Perhaps most important, loan selling is not a new business for banks. For years, banks have sold, participated in, placed, and syndicated their loans, usually, however, only with other banks. In selling commercial loans to a far wider range of investors, money center banks have simply dusted off and redesigned a long-standing business tactic to serve their current strategic planning.

BANK CHANCES TO LEND TODAY

Big money center banks have a variety of chances to lend these days, *two* of which stand out with respect to loan participations. The loans the banks have to sell are of two sharply differing sorts, with each sort being sold to a quite different group of investors. The first, loans made under commercial paper as backstop lines, has evolved from the banking sector's recognition that the commercial paper market had taken away a large part of the banking sector's traditional lending business. The banking industry decided that if it wasn't going to be able to be a direct lender, that it could at least earn a fee for backing up commercial paper issuance. The second type of loan relates to LBO loans.

Loans Made under Commercial Paper Backstop Lines

When companies sell commercial paper, the rating agencies want to see, as liquidity insurance, bank lines backing that paper, known as *liquidity enhancements*. Depending on the issuer, the rating agency might want the lines to be *committed* lines, that is, legally binding commitments on the participation of the lending bank, or they might permit just *advised* lines, saying that the bank will give the commercial paper issuer a line for \$X million, under which it may borrow from the bank at some mutually agreeable rate. A lot of the lines that banks have on their books are legally binding commitments in which, for a period of seven years, the bank agrees to lend to the commercial paper issuer at a formula rate, LIBOR + $\frac{1}{8}$ or whatever.

In most cases, commercial paper issuers seek 100% backing in order to maintain the highest possible credit rating and, hence, lower

borrowing costs. With most issuers maintaining the backing of the banking sector, few investors worry about credit quality and the risks of wide-spread default. This is why when Mercury Finance defaulted on January 31, 1997, on \$17 million of commercial paper, it did not have much impact on the overall commercial paper market.

The size of commercial paper backstop facilities tends to be huge, in the billions of dollars, and they are syndicated among a wide group of banks. The pricing on such lines is razor thin, LIBOR + $\frac{1}{8}$ with maybe a $\frac{1}{16}$ facility fee or less. Thus, this business is uninteresting to a bank that's looking to get a decent return on its balance sheet.

In the past, the only return that banks got out of issuing commercial paper backstop lines was a small fee for making a commitment to lend. In practice, corporations that took down committed lines from banks never borrowed under those lines at the stipulated formula rate, because the commercial paper market was so strong that they could always borrow in that market or in other markets for less than they could under their bank line.

Money center banks structure into most commercial paper backstop facilities called a *bid option*: in addition to borrowing at the formula rate, the line holder can come in and ask its committed lending group to bid for paper on a *non pro rata* basis—at a rate less than the committed rate. At times, a commercial paper issuer can, using such bid options, get money less expensively than he could in the commercial paper market.

Today, a large part of the loan sales money center banks make are advances extended to borrowers under the bid options on committed commercial paper backstops. Most typically, the loans sold range in maturity from 30 days to 9 months: under 30 days, corporations can usually borrow most cheaply in the commercial paper market, which is really a market for paper 30 days and under; over 9 months, corporate borrowers can go directly to the MTN market.

A growing proportion of the commercial paper issued in the United States is asset-backed. Banks sponsor most of these issues by establishing *special purpose corporations*, or special purpose vehicles, which pool assets and back the commercial paper with their cash flows. An example of such would be the cash flows associated with the release of a Hollywood movie or credit card receivables. Banks profit from the special-purpose vehicles by receiving a referral fee for the cash flow analysis that they conduct when establishing it. It is also a means of strengthening the relationships that banks have with customers whom they help in gaining access to the

commercial paper market. We discuss the topic of bank sales of asset-backed paper later in this chapter.

Thus, the loan participations we are speaking of here are short in maturity, very high in credit quality, and low in yield—basically paper appropriate for a conservatively managed liquidity portfolio.

LBO LOANS

A second type of loan that big banks have an opportunity to make these days is LBO loans, loans whose characteristics are the direct opposite of loans generated under commercial paper backstops. LBO loans are long in term, low in credit quality, and high in yield. LBO loan participations are *not* a money market instrument, but for completeness, we discuss them at the end of this chapter.

SELLING SHORT-TERM, HIGH-QUALITY LOANS

In discussing loan sales by banks, we begin where banks began the business, namely, with the sale of short-term, superior-quality, low-yield loans to conservative investors. “Superior quality” generally means that the borrower’s commercial paper is rated A-1+, P-1, F-1+, or A-1 or F-1. Sometimes, high quality is achieved through some form of credit enhancement. An issuer who did not want to release his numbers might buy a surety bond from an insurance company or get his debt backed by a letter of credit from a bank. Also, a subsidiary of a corporation might borrow with the parent’s guarantee.

The Beginnings

The sale of short-term, high-quality loans by banks began in the early 1980s, and by 1984, all money center banks were either involved in or had plans to enter this business. Bankers Trust and Citicorp are credited with pioneering the business; Morgan and Chase, which eventually merged, followed close at their heels.

In describing the mood and attitude with which banks entered this business, one banker noted: “We saw that increasingly our corporate business was moving away from us: our issuers were either in the commercial paper market, which is a cheaper way to raise working capital, or, alternatively, they were getting cheap money from foreign banks who were

willing to buy corporate loan business. Once we recognized that, plus the fact that new constraints, external and internal, were impinging on our balance sheets, two things became obvious: first, our balance sheets probably could no longer carry the marginal business we were getting from our corporate clients; second, even if it could, that business was not going to yield us the new and higher ROE and ROA we had targeted. The only logical conclusion was that if we were to continue to lend, we had to lend not for ourselves but for someone else—to *act as a loan intermediary*.”

The Loan Participation Agreement

In the discussion that follows, we take loan sales to mean *subparticipation* of loans, that is, situations in which loans on a bank’s book are sold, *to maturity* and on a *nonrecourse* basis, to another institution, which might, for example, be an insurance company, a pension fund, a mutual fund, or a corporate liquidity portfolio.

The Mechanics of Selling Loan Participations

Money center banks sell loans only to sophisticated investors, although these investors are often conduits to other types of investors who are considered somewhat less sophisticated than the professional crowd—households that invest in mutual funds, for example. Since there is no legal requirement for sophistication, a bank’s test of sophistication must be completely subjective. One bank culls unsophisticated buyers by saying it will sell only to entities having large amounts of assets. That at least keeps out small union and municipal funds and other small investors who might sue if a loan sold to them went sour.

After an investor has been vetted, he is asked to sign a loan participation agreement that is quite standard across the market. This short agreement, which is signed by both the investor and the selling bank, says basically that the agreement obligates neither the investor to buy nor the bank to sell loan participations, but if the bank offers the investor something he agrees to buy, the terms under which the sale will occur are thus and so. In particular, the bank often represents to the investor that it will administer any loan it sells in the same way it administers a loan it holds for itself. Also, the agreement indemnifies the selling bank for any legal expenses it might incur in the enforcement of the loan. The agreement often states, in addition, that the buyer *may not resell* the loan to another

investor without the consent of the selling bank. Finally, the agreement refers to a certificate that would evidence an individual loan participation if the bank were to sell one to the investor.

Once the bank and the investor sign the agreement, the bank and the investor would talk daily, weekly, or however often the investor wants to talk, and the bank would offer the investor whatever loan participation it had to sell. Say it was a 1-month corporate at $6\frac{1}{2}\%$. If that looked attractive to the investor, he would wire the selling bank money and in return get a loan participation certificate, which is a *nonnegotiable* piece of paper that would say, “You, ABC investor, have purchased from us \$5 million in our loan to XYZ Corporation. We will pay you $6\frac{1}{2}\%$; principal and interest are due on *X* date, if, as, and when we receive funds due from the borrower.”

Although not all loan participations are alike, loan participations have been made easier to create in recent years thanks to the standardization of legal documents related to syndicated loan trading. The Loan Syndication and Trading Association (LSTA), which was established in 1995, has been credited with the movement toward standardization, having developed more than two dozen standardized documents. The LSTA was formed by a small group of debt traders from major international financial institutions in an effort to develop standard settlement and operational procedures, market practices, and other mechanisms.

Investors in loan participations have a dual credit risk: to the borrower and also to the selling bank. The second risk arises because it is the selling bank that collects interest and principal and sends them on to the investor. For whatever time interest and principal collected by the selling bank are in the hands of that bank, those funds are not held in legal trust. Thus, if the selling bank were to go under, the investor would be in trouble—probably find himself a general, unsecured creditor of the bank. Thus, in determining the relative value of a loan participation offered to him, the investor needs to consider that he gets a higher rate on a loan participation than on commercial paper, but on commercial paper he has only one credit risk.

Three Motivations for Buying and Selling Loan Participations

There are three motivations for the buying and selling of loan participations: *to exploit a comparative advantage*, either by originating loans that can be

sold or by funding loans that are for sale; *to diversify portfolio assets*, particularly for banks that find diversification opportunities relatively limited; and *to overcome reputational barriers*, especially for those banks whose reputation might limit their access to the secondary loan market.¹

Banks with a comparative advantage in buying loans and those with an advantage in selling loans take advantage of their particular strengths in these areas. For example, there are some banks that have ample opportunities to lend but which also face capital constraints. These banks are generally more likely to be sellers of loan participations. On the opposite end of the spectrum are banks that have fewer opportunities to lend but plenty of capital. These banks are more likely to buy loan participations. The key metric in both cases is the capital ratio and a “hot funds” ratio, which measures the use of costly funding. The capital ratio is determined by taking a bank’s equity capital and dividing it by assets. The hot funds ratio is determined by taking the sum of brokered deposits, uninsured deposits, and federal funds purchased and then dividing this sum by assets.

Diversification motivates banks to buy and sell loan participations because many banks lack the ability to diversify internally. Demsetz (1999) notes from her findings that banks having good opportunities to diversify tend to be significantly less likely to participate in the loan sales market, especially as concurrent buyers and sellers. One situation in which this tends to arise is among those banks for which extensive branching is both permissible and possible. Demsetz found that the ability to branch statewide is associated with a 10 percentage point decrease in the predicted probability that a bank will participate as a buyer and seller, other factors notwithstanding.

In recent years, banks have been able to improve the diversification of their loan portfolios following changes in interstate banking laws. In particular, effective June 1, 1997, the Riegle-Neal Interstate Banking and Branching Efficiency Act of 1994 gave banks the ability to cross state lines, toppling 67-year-old legislation (the McFadden Act) that restricted such movement.

The third motivation for buying and selling—the existence of reputational barriers—is particularly strong on the sell side of the loan participation market because loan buyers scrutinize the reputation and credit quality of the seller. Some banks thus pursue relationships with multibank holding companies as a way of reducing the reputational barriers.

¹ For this section, the author utilized Rebecca S. Demsetz’s 1999 paper, “Bank Loan Sales: A New Look at the Motivations for Secondary Market Activity,” published by the Federal Reserve Bank of New York.

Membership in a multibank holding company tends to increase the likelihood that a bank will be active in the loan participation market, particularly when its affiliates are already participants in the secondary loan market.

Sales Volume and the Leaders in Sales

The leader in the loan sale business is today regarded as JPMorgan, followed by Bank of America and Citigroup. Fourth is Wachovia, but its tally is far below that of the first three, putting the top three in a class by themselves. Outside of the top 10, the regional banks start coming in; they are in the market, but they are small.

Data released by Reuters Loan Pricing Corporation indicate that the corporate syndicated loan market saw a record \$1.5 trillion of issuance in U.S. corporate syndicated loans in 2005. Of that tally, investment-grade lending was \$669 billion, leveraged lending was \$500 billion, and loans to institutional investors (mutual funds, hedge funds, and collateralized loan obligations) were \$224 billion. Low default rates and the strengthening U.S. economy were cited as reasons for the strength of the market.

Of the \$1.5 trillion in issuance in 2005, JPMorgan arranged a whopping \$421 billion; Bank of America, \$273 billion; Citigroup, \$256 billion; and Wachovia, \$89 billion.

Investors in Loan Participations

The main participants in the loan sale market are banks, finance companies, and institutional investors. This is a major change from the early days of the secondary loan market when banks dealt largely with one another. Nowadays, financial innovation has made it possible for all sorts of investors to access the secondary loan market. It is notable, for example, that Fidelity's Floating Rate High Income Fund, which consists largely of floating-rate loans, held roughly \$2.6 billion in assets as of January 2006.

Still, banks remain the dominant force in the market for secondary loans, as evidenced by JPMorgan's very large presence in the syndicated loan market. Much of the banking sector's involvement relates to the backup credit lines it grants to companies that use the credit lines in the issuance of commercial paper.

Financial companies make up a smaller portion of the loan sale market, accounting for less than 10% of the market, according to the LSTA, and

they tend to get involved in relatively smaller deals, say \$25 million to \$200 million.

Institutional investors include the mutual fund industry, which has created a variety of loan participation mutual funds known as *prime funds* because they were initially introduced as funds that would have returns that would mirror the prime rate. Other institutional investors include those structuring collateralized loan obligations, as well as hedge funds, insurance companies, and pension funds.

Money center banks used to sell a lot of loans to their correspondent banks in a very expensive-to-them way: they would sell down such loans at full fees and full prices. This meant, for example, that if a money center bank which was earning $\text{LIBOR} + \frac{1}{4}$ on a loan and had gotten an arrangement fee of \$100,000, sold 10% of that deal to a correspondent bank, the latter would get 10% of the up-front fee and a pro rata share of the commitment at full $\text{LIBOR} + \frac{1}{4}$. Eventually, the selling bank would take a skim, from the up-front fee and also a second skim equal to the difference between $\text{LIBOR} + \frac{1}{4}$ that the borrower paid and the $\text{LIBOR} + 20$ at which the bank might sell the loan to another bank. Today, the market has evolved so that the selling banks take very little if anything from the buyers of their loans. It's a razor-thin margin business for sure, especially compared to the syndicated loan market where lenders earn up-front fees, commitment fees, facility fees, letter of credit fees, administrative agent fees, as well as cancellation or prepayment and cancellation fees. The up-front fees for syndicated loans are often 1% for the \$25 million commitments, and 50 basis points for \$15 million commitments.

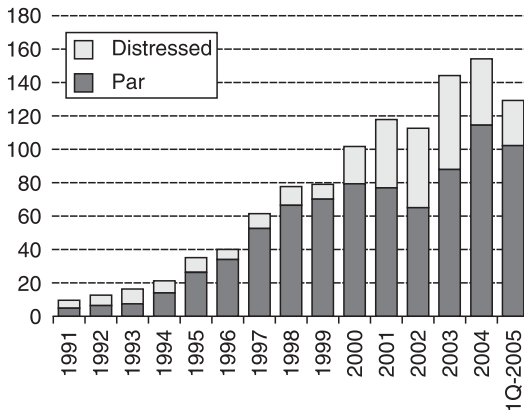
Liquidity of Loan Participations

As indicated, in a loan participation sale, a nonnegotiable certificate is issued to the investor. Thus, there are no dealers and brokers in this market as there are in the BA and CD markets, and the liquidity of loan participations is limited. Investors can trade secondary loans through the dealer desks at the large underwriting banks, but the volume is sparse relative to other investment vehicles. For example, the LSTA estimates that the total volume in secondary loans was \$155 billion in 2004, a skimpy tally when compared to the U.S. Treasury market, in which more than a half trillion dollars of Treasuries traded *daily*. Figure 23.1 shows the volume trend since 1991.

Making loan participations liquid is a problem. Loan participations are not exempt securities, as are BAs, so if a bank sold negotiable loan

FIGURE 23.1

U.S. secondary loan market volume (in billions of dollars)



Source: Reuters LPC Traders Survey

participations, it might run afoul of the law and be accused of selling unregistered securities. Selling banks can tell an investor, as they do, “If you need to sell, we will try to find another buyer and act as an intermediary.” However, a bank selling a loan participation cannot tell the investor, as would a commercial paper dealer, that it commits to buy back such paper at the market minus some spread whenever and if ever the investor should want to sell it; if the selling bank were to do that, it would not have made a *nonrecourse* sale of the loan and, consequently, the loan would remain on its balance sheet. In most cases, loans are sold without recourse so that they are not considered a contingent liability on a bank’s balance sheet. There are situations, however, in which contingent liabilities may result if the bank, as seller of a loan participation without recourse, fails to comply with the provisions of the participation and/or loan agreement. A certain degree of risk therefore exists in participation loans sold without recourse.

In theory, investor X, having bought a loan participation from, say, Morgan, might ask Morgan for permission to sell that loan participation to investor Y. However, it is difficult to see why Y would want to buy. If he did, he’d have a triple credit risk: for Y to get his money at the end of the deal, the borrower would have to pay off Morgan, who in turn would have

to make payment to investor X, who in turn would have to make payment to Y. Contorted, to say the least.

BANK SALES OF ASSET-BACKED PAPER

The market for asset-backed paper has grown substantially, with issuance topping \$3 trillion for the first time ever in 2006, at \$3.2 trillion (note that in April 2006, the Federal Reserve began reporting asset-backed commercial paper as a separate classification rather than as part of financial commercial paper). Investors have been drawn to the asset-backed securities (ABS) market in recent years for its attractive yield spreads and relatively good credit quality. For the money market, the growth of the asset-backed market has created a vast new pool of instruments for investors to choose from. For example, the money market investor can choose to buy short-term receivables from a credit card issuer and from a wide variety of issuers with a wide variety of terms. For issuers, the growth of the asset-backed securities market has significantly expanded the pool of funding sources to include the broad array of fixed-income investors, a market consisting of \$26 trillion in mid-2006. Commercial banks have become increasingly reliant upon securitization as a way of diversifying their assets.

Asset-backed paper is any paper, public or private, whose payments depend largely on the cash flows generated by dedicated financial assets, such as home equity loans, automobile loans, credit card loans, student loans, franchise agreements, and so on. Such paper is neither a general unsecured corporate debt obligation nor a secured corporate debt obligation. The paper is repayable out of the cash payments from the named assets and typically has only limited recourse to the corporate originator.

Asset-backed paper can be issued publicly or privately. Ford Motor Credit might, for example, have a lot of auto loan receivables that it wants to finance. It could go to JPMorgan and have Morgan create and sell a registered asset-backed security for them. For some, that can be too expensive an alternative. For companies such as Ford, the securitization of loans can help them to remove receivables from their balance sheets, which is a good idea from an accounting perspective. Although the costs of securitization are prohibitive for smaller companies, innovations in trust structures, such as the master trusts and issuance trusts that are created just prior to the issuance of asset-backed securities such as credit card ABS, have enabled issuers to lower issuance costs and thus increase the appeal of ABS issues to investors.

An alternative for those that do not securitize their loans is to go to a bank like Morgan and arrange a bank-purchased deal. Morgan, for its participation, may be interested in working with these companies on two counts: first, it might want to generate some high-quality assets for its own portfolio at a better rate than it would get if it bought publicly offered paper on which the underwriting dealer was making his cut; second, Morgan probably would plan to sell off parts of the deal in the form of loan participations.

The Mechanics of Issuance

The mechanics of bank-purchased asset-backs are simple. A money center bank goes to a Ford, a General Motors, a credit card issuer, or whomever, that has some receivables to finance. The bank, say it is Morgan, buys the receivables through a formal *receivables purchase agreement* from the borrower, say Ford. This agreement, which looks somewhat like the pooling and servicing agreement that a publicly offered, asset-backed security would contain, spells out the understanding between the bank and Ford. Under the agreement, Ford continues to collect interest and principal on the auto loans sold and forwards those collections to the bank. Ford earns a servicing fee for its efforts. Should Ford be deficient, negligent, or go away as a servicer, the bank can replace Ford with someone else, just as the trustee in a public offering of asset-backs could do.

In buying receivables, Morgan does not examine each loan, but rather looks at Ford's past experience with similar loans (e.g., loss and delinquency experience) and to Ford's representations about the characteristics of the pool of loans sold (information that would be in the prospectus of a public deal): that the loans are all current; that they are all aged 90 days; that they are for new, not used, cars; and so on. Morgan then makes a filing under the Uniform Commercial Code to perfect its interest in (ownership of) the body of car loans sold.

To allow for the fact that some auto loans are not paid off, that some cars do get repossessed, there is, in private as in public deals, credit enhancement provided by either the seller's contingent repurchase obligation or an overcollateralization. The recourse can be structured in many ways; which way is used depends on the creditworthiness of the seller and on the seller's accounting objectives. Under the repurchase obligation, Ford says, "I will repurchase the first 7% of any loans that go bad." With overcollateralization, Ford says, "I am going to sell you the first 93% of collections on \$X million of receivables; for this you have to pay me only

93 cents on the dollar.” Both approaches have the same effect of protecting the buyer of the receivables.

The one difference is that the reserve is payable out of the loan contracts themselves, whereas the contingent repurchase obligation is a general corporate obligation. That is why the accounting treatment differs for the two. Historically, reserves have run far higher than losses, which is pretty good protection to the investor.

In a public deal, to simplify the story to an investor, a receivables seller typically wraps the repurchase obligation or the overcollateralization with a letter of credit (LOC) from a bank. The public security buyer looks to the LOC for his protection, while the provider of the LOC looks to the repurchase obligation or the overcollateralization to reimburse any draws under the LOC.

In other words, the credit enhancement provided by the seller is the same in both the public and private markets. What differs between the two markets is that, from the buyer’s perspective, the public market recourse provision generally has someone else’s name on it (the LOC issuer), and it is rated. In a private bank deal, typically the recourse provision has no LOC slapped on it, and it is not rated. If a bank-arranged asset-backed loan sale agreement were to provide recourse, it would, under FASB Statement No. 140 (FAS 140), prohibit the removal of the asset from the seller’s balance sheet. What the bank is trying to accomplish with the loan sale is to remove it from its balance sheet, which is why recourse is usually not present in loan sale agreements. The bank would rather the sale be a *true sale* to a third party. Many loan sales contain an implicit understanding that recourse may be provided by the sponsor, in order for the sponsor to maintain its reputation for consistent credit quality over repeated sales. One way that the sponsor maintains its reputation is by providing recourse when it is not required in certain cases.

Selling Participations in Asset-Backed Loans

If a company has a \$1 billion pool of receivables to sell, Morgan might buy the whole pool under a receivables purchase agreement and then, after the fact, sell participations in that loan—\$100 million to one participant, \$100 million to another, and so on. Alternatively, a group of banks might agree to purchase together that company’s receivables, with each participating bank taking down, say, \$100 million of the deal. In practice, banks do private receivables deals both ways.

Loan Sale Market Breathing Easier Following FASB Ruling

In the summer of 2004, the Financial Accounting Standards Board (FASB) decided to continue to give sales accounting treatment to loan participations. This was a practice that was previously allowed under FASB Statement No. 140 (FAS 140), but it had come into question earlier in 2004 when the FASB began amending FAS 140, seeking to address issues related to transfers of financial assets. The participation industry was worried that if FASB had reversed its previous rulings, this would have caused balance sheets to bloat all across the banking sector, thus inhibiting lending activity. FASB determined in its most recent decision that the selling of loan participations constitutes a “true sale,” which is what is required for a loan to be removed from a bank’s balance sheet once it is sold. FASB has provided four guidelines to help banks determine whether their loan sales are “true sales.” Briefly, these include: (1) that the seller has provided no guarantee of repayment or recourse in the sales agreement; (2) that the transfer purports to be a sale of a property interest in the underlying financial assets; (3) that the interest holder’s interest in the financial assets has the same remaining duration as the underlying financial assets; and (4) that the transferor must agree to act as a custodian for its holding of any underlying instrument or collateral and in holdings of any proceeds received on the underlying financial assets.

Yield

The principal advantage to investors of a private, asset-backed deal is yield. While conditions in the public and private markets are constantly changing, the investors’ yield on a bank deal can be 15 to 20 basis points better than on a public deal. The trade-off is that participation in a private deal is less liquid than are publicly offered securities. Publicly traded credit card and automobile ABS yielded roughly 40 basis points over Treasuries in 2005, and home equity ABS yielded about 80 basis points over Treasuries.

LBO LOAN PARTICIPATIONS

Participations sold in bank LBO loans are definitely *not* money market instruments. However, since they are huge, much discussed, and a cousin—albeit distant—of the loan participation sales we’ve been discussing, we conclude this chapter with a short discussion of LBOs and of bank loans to finance them.

LBOs in a Nutshell

In 2004 there were 126 LBO deals announced, with a total value of nearly \$100 billion, a new record according to Standard & Poor's. That was nearly double the previous year, highlighting the return of LBOs. Announced deals included ESL Investments' purchase of Kmart and Sears, Highfield Capital's purchase of Circuit City, and Cerberus Capital's purchase of Toys 'R' Us. What is notable here is that all three purchases were by hedge funds, which have carved out a major presence in the LBO market; the LBO market now consists of over 800 participants most of which are hedge funds. Rounding out the field are the traditional LBO funds, which totaled nearly 100 in 2004 compared to just 5 in 1989, and, more recently, insurance companies, pension funds, and even college endowments. Worldwide, nearly 500 buyout firms raised \$261 billion in 2005, according to Private Equity Intelligence Ltd., a level beat by almost twofold in 2006.

For the reader who knows that an *LBO* is a *leveraged buyout* but is a touch vague on what that means, we begin by sketching the *bare bones* of such a deal.

An LBO is a buyout, sometimes by management, sometimes hostile. Say the stock of XYZ Corp. is selling at \$50 million, and management decides to make a bid of \$100 million for the company. Management, which probably has little or no cash to invest, and its LBO group—Kohlberg Kravis Roberts & Co. (KKR) or one of the other buyout partnerships or funds they manage—might put up, say, \$20 million of equity and borrow the other \$80 million, making the deal leveraged 4 to 1. The buyout group might borrow \$40 million from the banks *long term* and do a \$50 million *bridge financing*, that is, borrow from the banks \$50 million short term to tide it over until it sells \$50 million of *junk (sub-investment-grade) bonds*.

The motive of management in an LBO deal may be to prevent a hostile takeover. Often, it's to enhance managers' own wealth—sometimes their power and prestige. That isn't to say that, economically, LBOs are always a bad idea. To pay off the large amount of high-cost debt with which it has saddled itself, management will have to cut costs, operate more efficiently, and frequently sell healthy operating divisions; otherwise, it's going to end up bust.

Normally, an LBO deal would be structured such that management, having put up no money, ends up—assuming the banks and the junk bonds get paid off—with 20% of XYZ, which is now a privately held company. The other 80% of XYZ ends up being owned by the LBO group and the

various LBO funds that together have put up \$10 million in equity. KKR, Merrill, and others manage huge specialized LBO funds that do nothing but invest in LBO deals, so there's no dearth of equity funds available for doing such deals. In our assumed deal, the LBO firm might put up \$1 million of its own money, and its own LBO fund or others might put up another \$9 million of equity.

In an LBO, part of management's strategy for paying off its heavy debt may be to sell off divisions of the company. Such divisions may be sold to another company, or they may be sold via a *spin-off LBO* to the management of the division being sold. Many companies have been sold off in this way to their management, and today they are making a fortune.

The rationale behind LBOs is that mature public companies often sell at a substantial discount from the price they would command if they were private. Growth companies are an exception; they sell at a premium.

Private ownership has a different value from that of public ownership. For one thing, the job of the president of a large public company is not just to enhance stockholders' wealth; he must satisfy various constituencies—consumers, the workers, the stockholders—and then he must take care of himself and his friends; to do the latter, he builds up an empire with perks, planes, a suite at the Waldorf, a golf club in Florida, and a fishing lodge in Canada. If such a company goes private, it can pare such frills and cut costs: management can become like a Sam Walton and run around in a pickup truck, have a billion, and it's your own billion. Also, management in an LBO typically sees ways to operate more efficiently, which isn't surprising. For a public company to be efficiently run, it must have a strong private content, as Ford once did and as most public companies don't.

There are also tax advantages to private ownership. First, management can pay itself big salaries instead of double-taxed dividends as long as the compensation isn't so large that IRS deems it to be "unreasonable" (in which case, the portion of compensation deemed to be unreasonable is taxed as if dividends had been paid). Second, a private company can leave in the company monies that would have been paid out as dividends, but again a *caveat*: there can be a tax on "excess retained earnings" if the monies retained aren't needed for business operations (this creates no problem for a growing company that's reinvesting retained earnings). Third, monies left in the firm get taxed only once as part of an inheritance, and the heirs end up, in the best case, with the whole company; naturally, any dividends received by the heirs are taxable income to them.

Management of a company that's been taken private may also take an alternative route. Once it's trimmed costs and made operations more efficient, management's number one priority is to use the monies thus saved to pay down the company's bank loans and junk bonds. Then, management may choose to make its bundle by taking its now private company *public* once again.

Bear-Hug LBOs

Normally, an LBO firm, like KKR, will work hand in glove with management. However, things can get messy, and the LBO outfit might decide to do the LBO and replace existing management with its own handpicked team of managers. In this case, it is the new, not the former, managers who end up with an equity stake in the now private company. There is a danger in an aggressive move such as KKR made on RJR Nabisco in 1988, which at \$25 billion was the largest LBO in history until the \$31 billion LBO for HCA Inc. in 2006. Formerly, companies perceived KKR as a friend of management. By having played an at least uninvited, if not hostile, role in the RJR Nabisco LBO and many other deals, KKR, as well as any LBO firm, risks limiting the number of CEOs who will be willing to sit down and talk with it in the future.

Buyers of Junk Bonds

By early 2006, the junk-bond market had swollen to \$850 billion outstanding. Junk bonds, which are also commonly known as speculative-grade bonds, are sub-investment-grade bonds and thus pay a high yield relative to investment-grade bonds, and there seem to be numerous investors who believe that they can evaluate the risks inherent in such paper and pick issues that will turn out to be good investments.² In fact,

² The seminal work on junk-bond defaults was done by Edward I. Altman of New York University and Scott A. Namacher of Pepsico, Inc. (Drexel Burnham Lambert was also an early groundbreaker in the analysis of yields and default rates on junk bonds.) The thrust of this work is that yields on these bonds are higher than required by their true risk. In April 1989, a controversial, unpublished study by Paul Asquith et al. from Harvard indicated that true default levels were substantially higher than those calculated by Altman and Namacher. The nature of the disagreement between the two studies lies in their methodologies, n.b.: Are losses to be looked at on a coincidental or cumulative basis? Many observers consider the issue of the true risk level of junk bonds to be unresolved, although in recent years, low default rates for junk bonds has tilted investor opinion in favor of the junk-bond sector (the default rate for junk bonds was 2.2% in 2005, according to Moody's).

as an asset class, high-yield bonds have been embraced increasingly over the year. In any case, insurance companies, pension funds, and especially mutual funds have become big buyers of junk bonds.³ Thrifts, too, have been buyers of junk bonds. Low default rates during much of the 1990s and the early 2000s is one of the reasons for this increased acceptance.

Originally, banks provided the bridge financing for LBO deals, but they would do so only if an investment banker had made a firm commitment to underwrite the high-yield bond issue that was to finance the deal long term. Then, certain investment banking firms, starting with First Boston, said—as a tactic to break Drexel’s lock on LBO business—“We’ll do the bridge financing and then worry about selling the bonds.” Other investment bankers followed suit to provide some or all of the bridge financing on certain deals. The risk in providing bridge financing is that, if the junk bonds fail to sell during a specified period, the short-term bridge loan may convert, depending on how it’s structured, into long-term securities conferring equity rights in the LBO; that might leave the lender a reluctant investor. The increased liquidity of the high-yield bond market has reduced this risk in recent years, particularly given the strong demand that mutual funds have shown for new issues.

A big part of the debt assumed in an LBO is senior bank debt with a term of around seven years. Banks love this sort of lending for several reasons. They get large origination fees for committing themselves. These fees can be as much as 2% or so of the overall facility. Another attractive feature of such debt to banks is that LBO lending can account for an attractive share of new bank lending to corporations, often done at a generous spread of as much as 2 points or so over LIBOR.

Finally, lead banks in an LBO make money by selling loans to other banks. The process of going from a large to a smaller underwriting commitment varies from bank to bank. Some big banks take the position that you find primary lenders, buyers who sign in on the agreement and are in there with full rights; such banks subparticipate as little as possible. Other banks prefer to whittle down their underwriting commitment by selling to maturity participations in the underlying loan. Banks that take the latter route try to retain some skim on the amount of the sale, although it is usually very slim, and often there’s none at all. Thus, the mechanics of such loan sales resemble those we describe earlier with respect to the

³ Purchases of junk bonds by insurance companies and by pension funds are subject to statutory limits.

sale of subparticipations in commercial paper backstop loans. A bank that does not try to get a skim in distributing its underwriting commitment on an LBO loan still gets agency fees, a relationship with the customer, and visibility as a big player.

Most sales by banks of LBO loans are to other banks, hedge funds, insurance companies, and pension funds. Traditionally, most nonbank buyers bought only investment-grade credits. Today, however, pension funds and the like are getting into participating on a primary basis in some highly leveraged debt.

According to the Office of the Comptroller of the Currency (OCC), many multinational banking companies have both direct and indirect equity investments in highly leveraged transactions (HLTs) such as LBOs. Intense competition has led these companies to seek to provide or arrange financing of lending transactions, including taking an equity stake. Equity investments have been made by small business investment corporations (SBICs) owned by bank holding companies and their affiliates. Indirect investments are made through investments in specialized funds (LBO funds) whose sole purpose is to provide financing for HLTs for their own accounts. National banks generally haven't made direct equity investments in LBO funds because of restrictions previously tied to the Glass-Steagall Act.

An LBO loan is complicated and risky, and the accompanying documentation is long and involved. Consequently, subparticipations in such a loan can be sold only to buyers who understand such things.

Subparticipations in an LBO loan may also be quite illiquid as limitations on resale are likely to be built into the sale agreement; any number of limitations are possible. In particular, to resell, the buyer of the debt may need to get permission from either the borrower or its agent bank.

Sales of subparticipations in an LBO loan are done with no recourse. Also, the buyer of a subparticipation buys *with full rights*, which means that he gets all voting rights under the agreement with regard to changes in the covenants, interest rates paid, and so on. A structured deal, like an LBO, will contain a series of financial covenants—promises that the borrower makes to the lenders who must vote on any changes, amendments, or waivers of those, among other things.

The LBO also makes, in the indenture of its junk-bond issue, certain promises to the buyers of its bonds. This bond issue, like any bond issue, has a trustee, one of whose responsibilities is to track whether the LBO company is in compliance with the promises it made to holders of its public debt.

In an LBO, the complex debt agreement that management makes with bank lenders is likely to trigger default before covenants made to public debt holders do; however, the public debt (the junk-bond issue) may contain a cross-default provision saying that if the LBO defaults on its bank debt, that default will automatically trigger a default on its publicly issued debt.

In an LBO deal, the bank debt is generally senior debt; the junk bonds, subordinated debt. The distinction between senior and subordinated debt is a matter of priority of payment. In theory, senior debt holders are supposed to get paid off before subordinated debt holders do; that's one reason why, if an LBO calls for 7-year, senior bank debt, the subordinated debt will have a longer maturity, maybe 10 years. As a matter of practice, in bankruptcies, theory and practice often turn out to differ. In a bankruptcy, it's not unusual for senior debt holders to get as much as 75 cents on the dollar, while subordinated debt holders get around 35 cents on the dollar. Moody's noted in a January 2006 study that the recovery rate for senior unsecured bonds was 56%, which was well above the 36% average seen from the period 1982–2005. These relatively good recovery rates have added to the allure of high-yield bonds in recent years, and low default rates have increased the allure even more. In January 2006, the default rate for speculative-grade debt was 1.8%, Moody's data show, which is low enough to make a lot of investors confident about investing in speculative-grade debt, at least until the default rate begins rising again.

LBO Fears Were Unfounded

Recalling real estate investment trusts (REITs) and LDC loans, during the late 1980s and early 1990s some banking observers feared that banks, in their LBO lending, were taking on excessive risks that would come home to haunt them. For example, in late 1988, Chairman Greenspan of the Fed and William Seidman of the FDIC both sounded warnings about the risk posed to banks by LBO lending. Similarly, senior Japanese officials warned Japanese banks to approach leveraged buyouts with caution and, in particular, not to lend a disproportionately high amount in any one deal.

These warnings notwithstanding, the LBO market proved to be no problem for the U.S. banking industry. Although the 1990s began with difficulties for the banking industry with the failure of hundreds of U.S. savings and loan institutions (costing U.S. taxpayers \$153 billion, the FDIC says), the problems were unrelated to the LBO market, and the industry recovered substantially in the years that followed. Indeed, according to the

FDIC's *Quarterly Banking Profile* for the second quarter of 2006, the net income earned by insured commercial banks and savings institutions during that quarter was a record \$38.1 billion. The banking industry clearly had correctly evaluated the risks associated with LBOs and received an excellent return relative to risk assumed. The lack of any major failures associated with LBOs and the substantial profitability of the banking sector shows that the industry was right to view its foray into the LBO market as an attractive venture.

A second attractive feature of the loan-underwriting business is that, since term bank loans are an expensive part of an LBO financing package, they are often refinanced, perhaps several times, as the fortunes of the company that has been bought out improve. Moreover, the secular decline in interest rates from the early 1980s to the early 2000s afforded borrowers the opportunity to refinance at lower rates. Each time this occurs, the initial loan is repaid, and a new loan is floated at a lower rate. Thus, each such refinancing gives banks a chance to earn yet more underwriting profits.

REVIEW IN BRIEF

- The selling by banks of loan participations is one manifestation of their commitment to evolve out of old-style banking and into new-style banking, with the distribution of loans a top priority for many banks.
- The increased securitization of bank assets (particularly mortgage loans) has played a major role in transforming the banking industry, with banks placing greater emphasis on fee income.
- Bankers seeking to recapture lending lost to the burgeoning commercial paper market have turned instead to providing backstop facilities to new commercial paper issuance, albeit at skimpy margins.
- Loan participations are usually structured in a way that results in a “true sale” for the loan seller, thus enabling the bank to remove it from its balance sheet.
- Investors in loan participations have dual risks: to the borrower and to the selling bank.
- According to a Fed study, there are three motivations for a bank to sell its loans. These include: to exploit a comparative advantage, for diversification, and to overcome reputational barriers.

- The market for asset-backed debt has grown to over \$3 trillion as of June 2006 and includes both publicly traded securities and privately issued loans.
- A 2004 FASB ruling allowed bank loan sales to continue to be counted as “true sales,” a crucial development for the loan sale market.
- The LBO market reached a record \$100 billion in 2004, with the growth in private equity firms fueling new buyouts.
- Despite fears that LBOs might present a danger to the U.S. banking system, no major problems have occurred, and the industry recorded \$38.1 billion in record net profits in 2006.

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Medium-Term Notes

The *medium-term note (MTN)* is a product stretching back to the 1980s. In part the MTN market is a dynamic continuation of the trend toward securitization, one whose roots trace back, distantly, to the origins of the commercial paper market. In addition, the MTN market provides a dramatic illustration of how financial markets evolve in response to changing economic stimuli. Finally, the MTN market is a natural counterpart to the swap market; these two markets enjoy a symbiotic relationship: both originated at the same time, and the growth of each has fed that of the other. At the end of 2004 there was \$639 billion of MTNs outstanding, almost three times more than a decade earlier. Whatever view one takes of the source of the MTN market's vigor, indisputably MTNs are a securities success story.

THE BEGINNINGS

Major players in the commercial paper market, such as General Electric, General Motors Acceptance Corp (GMAC), Ford Motor Credit (FMC), and other big finance companies, have long sold their paper direct to investors. In 1972, GMAC began also to sell medium-term notes directly to investors since doing so was an ideal way for it to match fund auto loans. However, the market for such MTNs was small; consequently, the paper was illiquid, and investors demanded a relatively higher yield to buy it. Eventually, MTNs would be seen as a means of bridging the financing gap between funding from commercial paper and long-term bond issuance.

Shelf Registration and Rating

Any corporate debt having a maturity at issue of more than 270 days (the cutoff for exempt commercial paper) must be registered with the SEC. In March 1982, the SEC adopted *Rule 415* on a temporary basis and finalized it in November 1983. This path-breaking rule permitted *shelf registration* of new corporate debt issues. Under shelf registration, all would-be issuers need file with the SEC their historical and current financials and a description of the type and amount of securities they plan to issue under their shelf, which allows the issuers to file just one registration statement with the SEC for the future issuance of securities.

Rule 415 made life easier for issuers of MTNs: before it, every time an issuer experienced a material change in condition and every quarter when it had new financials, it had to rewrite and reprint the documentation it had submitted to the SEC, a procedure that cost time, money, and legal fees. After 415, an issuer was permitted to incorporate changes of the above sort “by reference” into its initial filing with the SEC. An issuer of MTNs always had the right to change the rates it offered on new paper whenever it chose to—GMAC did this from 1972 on—so the procedure of continuously offered MTNs was in place prior to 415.

When a would-be issuer files with the SEC, it typically obtains, at the same time, a rating for its shelf from one of the rating agencies. That rating would be for some specific amount of possible new debt.

A rated shelf merely puts the SEC and the rating agency on notice as to what debt the filer of the shelf might issue. Basically, what the SEC wants to track is what is going on in the debt market, whereas the rating agency is interested in what the issuer’s creditworthiness would be if it issued securities.

Once a company has filed a shelf and gotten that shelf rated, it need not sell immediately, or even ever, the full dollar amount of securities for which it has filed. Alternatively, the company might decide that it wants to sell more securities than it initially filed for—not \$400 million, but \$500 million. In that case, the issuer must inform both the SEC, which would amend the shelf, and the rating agency, which would review its rating of the shelf.

Originally, the MTN market was designed to fill the gap between the commercial paper and corporate bond markets. Also early on, most of the companies issuing shelf paper were finance companies such as GMAC and FMC. These companies, with their great appetites for cash,

needed to widen and deepen, to the extent possible, their access to the debt market. Some of the early sales by such companies of MTNs represented match funding, but such companies are now so sophisticated in managing their assets and liabilities that they not only match fund but frequently mismatch, making calculated interest-rate plays.

Merrill: Market Midwife

What really got the MTN market off the ground was not Rule 415; rather, it was Merrill's vision that GMAC's MTNs need not trade like diseased animals, but could instead trade consistently with GMAC's other notes of similar maturity. For this to occur, Merrill had to and did commit itself to creating a new market.

In the old days, when an investor who had bought MTNs directly from GMAC wanted to sell those notes, she was told by GMAC to go to a dealer. Dealers weren't much interested in making a good bid on such notes for two reasons: they hadn't sold the notes at issue, and they weren't involved in the market—had no ready contact with investors who'd want to buy the notes.

Merrill's idea was that a dealer of its strength could, on its own if it so chose, render MTNs liquid by committing itself to making good bids at all times to any investors who wanted to sell notes issued through it. This notion was both novel and bold since previously people had equated liquidity with the presence of many dealers in a market; and in the beginning, Merrill was alone in the MTN market.

Merrill's strategy for creating a market in MTNs was simple: ape the commercial paper market, but make a far stronger commitment to developing and maintaining an active secondary market. To this end, Merrill set up a trading desk dedicated to MTNs; people on that desk daily contacted issuers, posted their rates, and interacted with salespeople. Merrill also made a commitment to provide liquidity because lack of liquidity was the principal reason why MTNs had traded at a higher yield than similar corporate underwritten notes. Specifically, Merrill promised to dedicate a significant portion of its capital to taking positions and to making markets in MTNs—all to provide liquidity to investors. Merrill reasoned, correctly, that today's seller of MTNs would be tomorrow's buyer.

The starting gun in the MTN market was sounded in 1981 when Ford Motor Credit began to sell MTNs, first through Goldman and later also through Merrill as agent. In 1983, GMAC also began to sell MTNs

through Merrill as agent, and Chrysler Financial did so shortly thereafter. These big issuers paved the way for others (general finance companies, industrial companies, and banks) to enter the MTN market and for a secondary market to develop in MTNs.

Once MTNs began to take off, other dealers saw the promise in this market and promptly entered it.

MTNs: THE PRODUCT

Over time, the product sold in the MTN market has evolved. MTNs began as fixed-rate, medium-term, unsecured corporate obligations offered on a continuous basis in a range of maturities at yields reflecting the shape of the yield curve and the appetite of the market for the issuer's paper. Today, the stock in trade of the market is far more diverse.

Commercial banks and bank holding companies (domestic and foreign), thrifts, securities brokers, manufacturers, wholesalers and retailers, sovereigns, foreign government agencies, federally related agencies, and others have joined the original group of issuers, which comprised mostly domestic finance companies. In addition to unsecured senior debt obligations, the market now deals in paper that is credit supported: LOC paper, asset-backed paper, and so on. Also, a goodly proportion of MTNs are, today, medium-term bank deposits created through the sale of *deposit notes*.

Maturities of MTNs range from 9 months to over 30 years, and the investor generally has the option to choose the exact maturity date she desires. As such, today the term "medium" is a misnomer for MTNs. MTNs pay interest on a 30/360-day basis, and most are noncallable and nonrefundable. Fixed-rate MTNs generally pay interest semiannually on two preestablished interest-payment dates, regardless of their maturity date. Floating-rate MTNs pay interest at specified floating rates, which reset at various intervals and may be set at a spread to any one of various indices such as LIBOR.

MTN programs are usually rated by nationally recognized credit-rating services such as Moody's, Standard & Poor's, and Fitch.

Figure 24.1 shows a specimen MTN from the days when MTNs were in registered form. The issuer was Merrill Lynch & Co., Inc., and the paper was sold on Merrill's MTN desk. Dealers are one more type of entity that has joined the ranks of firms issuing MTNs.

FIGURE 24.1

Specimen MTN: issuer Merrill Lynch & Co., Inc.

[illegible]

DISTRIBUTION OF NEW ISSUES

Today, a typical issuer of MTNs has a few dealers whose duty is, as in the commercial paper market, to represent the issuer. Daily, or from time to time, the issuer posts rates with the dealers who represent her. She might say, “At two years, I will take money at 40 off the [Treasury] curve,” or whatever. The dealers would then market her paper in the amounts she wanted, confirm trades with her, and take their fee.

The near-standard fee for the industry is 20 to 40 bp or perhaps even more depending on the maturity, rating, and novelty of the paper sold; by “novelty” we mean whether the issue is a first or has some unusual feature

that means that the dealer will have to hold the issuer's hand and also do a lot of explaining to investors. One of the advantages of a standard commission is that the selling dealer has no vested interest in selling, say, Ford over some other issuer. A standard fee gives the market more of a commodity flavor for dealers selling MTNs, which in turn works to the benefit of issuers.

LATENT INVESTOR DEMAND

The money market provides investors with a wide array of short-term instruments that vary with respect to credit, yield, maturity, and degree of liquidity. At the opposite extreme are corporate bonds, long in term and normally not actively traded once they are distributed. The investor who wants something in between is left with relatively low-yield Treasuries and agencies, many of which, especially agencies, are not particularly liquid.

Until the advent of MTNs, what the market lacked was high-quality, corporate paper in the short end. As indicated by the eagerness with which buyers of MTNs eventually snapped up such paper, there were a lot of banks, bank trust departments, insurance companies, thrifts, investment companies, and muni bodies that had a large and unsated appetite for such paper.

It is indicative of the latent demand for medium-term paper that a large portion of the issuance of such paper is investor-driven: that is, the investor calls a dealer saying, "I need \$10 million of 6-year paper. What can you find for me?" The dealer then scouts around for an issuer who wants to write such paper.

The 30/360 versus Actual/360 Hurdle

Some people would have said: "What's the big problem with respect to medium-term paper? For years, banks have been offering, off and on, to sell fixed-rate, medium-term CDs—with little success."

One problem with bank medium-term paper was that it lacked liquidity. That problem in turn reflected the fact that large classes of investors, including insurance companies, would not buy medium-term bank paper in what had been its standard packaging. The reasons were several. One, hard to believe, is that insurance companies found it difficult to cope with the way bank paper accrued interest.

Many institutional investors, particularly insurance companies, buy a lot of corporate paper, which pays interest on a 30/360-day basis. (If a month has 31 days, no interest is paid for the last day of the month—a not-so-good

deal.) Bank paper, on the other hand, pays interest on an actual/360-day basis. The fraction $365/360$ equals, to four decimal points, 1.0139; thus, if 3-year corporate and bank paper are both offered at 4.5, the bank paper pays

$$4.5 \times 1.0139 = 4.56255$$

that is, $4\frac{1}{2}$ on a corporate bond basis. That calculation is a touch rough because a fully accurate comparison must take into account the day and month on which the paper is bought, whether a leap year is coming up, and so on. But computers can be programmed to take care of such diddling things.

With or without a computer, it's easy to see that an actual/360-day yield *grows bigger* when it is restated on a 30/360-day basis. One would have thought that this simple insight would have spurred insurance companies and other traditional bond buyers to reprogram first their thinking and then their computers; doing so would have permitted them to compare, on an apples-to-apples basis, yields on bank and corporate paper and thus to make investment decisions on a more rational basis. Not so. "I would have difficulty," noted one dealer, "overestimating the occasional laziness of bond investors. For many of them, the problem of 30/360 versus actual/360 is insurmountable. They would not buy a term CD because they could not compare its yield to that of a corporate bond.

"By and large, 99.8% of the securities bought by the typical corporate investor are 30/360. He does not want to deal with any security that pays actual/360. To him, such securities are a nuisance to buy and to periodically mark to market. Also, on a swap, he wants to be able to figure, with no fuss, whether he is getting a yield pickup or give-up."

In defense of the investor in corporates, since she is not alone in her aversion to actual/360-pay securities, the latter are in the term market much less liquid than are 30/360-pay securities. Thus, in selling a term CD, the investor might easily give up, in the *dime bid-offer spread*, more than the extra interest she had earned by buying that CD because it yielded an extra 20 or 30 bp.

In any case, when MTNs were set up, there was no contest about how yield should be fixed. From day one, MTNs paid on a 30/360 basis.

Pick Your Moment to Invest

MTNs proved to have another advantage from the viewpoint of investors in corporates. Once the market became established, there were lots of issuers, and consequently, there was always paper that an investor, once

she had funds, could immediately draw down from some issuer's shelf on a more or less custom-tailored basis and pick her maturity date. The same investor, if she chose to buy an underwritten corporate bond, would have to wait for a deal she liked, and her latitude to pick a maturity that suited her would be far more limited.

LATENT BORROWER DEMAND

Borrowers for their part found MTNs a boon. Documentation was simple, a lot simpler than negotiating loan-by-loan indentures for a series of bank loans. MTNs put money on tap for borrowers. Moreover, it was flexible money: borrowers could draw it down as they needed it *and* in the specific maturities they needed.

Finance companies may have been the first big borrowers in the market, but others soon followed: industrial corporations, utilities, thrifts, and sovereigns such as the Kingdom of Sweden, which seems to find a way—swap or whatever—to make borrowing in every debt market invented a good deal for it; also, with the World Bank taking the lead in 1989 and others following by offering COLTS (*continuously offered long-term securities*), which were designed to cut transaction costs for the borrower. As Table 24.1 shows, bank borrowers, too, form a big segment of total MTN issuance. The bank borrowing shown in Table 24.1 includes issuance at both the bank and the bank-holding-company levels. We discuss such borrowings below.

GROWTH OF THE MARKET

As they fitted the needs of both borrowers and lenders, domestic public MTN programs outstanding expanded from \$2.6 billion in 1981 to over \$60 billion by early 1989, \$240 billion by 1994, and \$446 billion by 2000 (Figure 24.2).

The MTN market fills the needs of companies with varied borrowing needs, and the size of individual offerings can vary a great deal. In addition, borrowers who have used the MTN market are almost without exception investment grade. At the end of 2004, \$622 billion of the \$639 billion in MTNs outstanding were rated as investment grade. Almost a third of that total, \$186 billion, were rated AAA. Borrowers with triple-B ratings were in the distinct minority at \$38 billion.

TABLE 24.1

Medium-term notes outstanding, as of the end of 2004
(in millions of dollars)

Issuer	2004
All U.S. corporations	639,426
Financial corporations	560,299
Finance companies	301,830
Auto	48,827
Other	253,004
Commercial banks	48,924
Other depository institutions	300
Securities brokers	99,141
Asset-backed institutions	44,038
Other*	66,065
Nonfinancial corporations	79,127
Electric, gas, and water companies	21,294
Manufacturing companies	26,458
Services	10,562
Telephone and communication companies	8,784
Transportation, mining, and construction companies	4,788
Wholesale and retail trade	7,241

*"Other" financial corporations consist of insurance and real estate firms and miscellaneous investing institutions.

Source: Federal Reserve

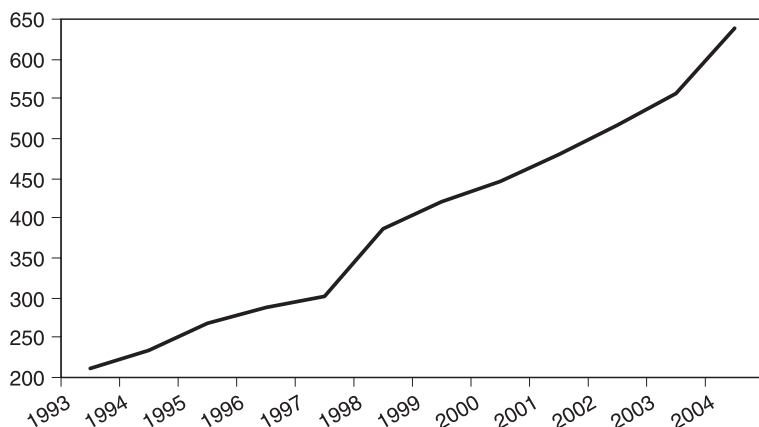
Privately Placed Paper

The MTNs we have been talking about so far, and to which all figures in this chapter apply, are rated, publicly offered paper. There is also a *private* MTN market. An issuer in this market might not choose to get its paper rated, perhaps because it doesn't want to divulge sufficient information to do so; an example would be a foreign bank that has hidden reserves and wants to keep them hidden.

Rated MTNs are, as noted, all investment grade (above a triple-B minus) at issue. The MTN market is not a junk (double-B or less) market, although a very small amount of junk-rated debt exists. Probably, one reason that no junk MTNs are issued in size is that, in a leveraged buyout, the buyer-borrower needs quick access to a large amount of money: maybe \$1 billion

FIGURE 24.2

Growth of the medium-term note market; medium-term notes outstanding (in billions of dollars)



Source: Federal Reserve

or more *my pronto*. The MTN market can handle that sort of size but only on a gradual basis; a borrower can do that over time but not easily over two days. Having said that, we note that in 1988 Philip Morris filed a \$3 billion MTN program to help finance its \$13 billion acquisition of Kraft, a company whose large and dependable cash flows made such financing attractive.

Maturities

At the beginning, maturities in the MTN market ran from nine months, the cutoff for commercial paper, out to several years. Since then, maturities have lengthened dramatically. First, investors bought short paper, then as they came to believe that there was indeed liquidity in 2- and 3-year MTNs, they became willing to move a bit further out on the yield curve, and then again a bit further. Today, MTN maturities of 5, 10, and 15 years are common, and maturities as long as 30 or even 40 years are not unusual.

Issuers for their part have often been eager to lengthen maturities. Those that issued floating-rate MTNs could hedge their interest-rate risk with Eurodollar futures, which now extend to 10 years, or lock in a fixed rate with an interest-rate swap, routinely done beyond five years.

The lengthening, over time, of the maturities of MTNs issued has contributed substantially to the growth of MTNs outstanding. Year to year,

issuance of MTNs has increased, but outstandings of MTNs have risen far faster.

In 1981, 70% of MTNs issued through Merrill had a maturity of nine months to two years; the remainder had a maturity of two to five years. By the late 1980s, the numbers had flipped: only 22% of MTNs issued through Merrill had a maturity of nine months to two years, and 21% had a maturity of more than five years. Hence, this is how “medium term” became a misnomer.

YIELDS ON MTNs

Yields on fixed-rate MTNs are always quoted at a spread off Treasuries. How large that spread is varies depending on the credit of the issuer, the maturity of the note, and the general level of interest rates. Invariably, credit spreads widen as rates rise; narrow, as rates fall.

For a number of years, banks generally traded wide to industrials, a phenomenon that reflected investor demand; owing to the money center banks' well-publicized problems with less-developed-country (LDC) loans in the 1980s and then the savings and loan crisis of the early 1990s, investors were inclined to take a dim view of bank credits. Thus, investors were demanding, in the five-year area, 70 off for a triple-A bank, versus only 45 off for a triple-A industrial. Today the situation is flipped; in mid-2006, investors were demanding about 25 basis points more for a double-A industrial than for a double-A bank. The reversal is the result of the intense global competition that the industrial sector has been under for many years (particularly from Asia) and because the U.S. banking sector is arguably as strong as it has ever been.

Because the MTN market is a subset of the corporate bond market, anything that affects demand by sector and thus sector-yield spreads in the bond market affects, similarly, the MTN market. In other words, when credit spreads on corporate bonds either widen or narrow, it is likely that similar impact will be seen in the MTN market.

Floating-Rate MTNs

Currently, a small percentage of MTNs issued pays a floating rate. An entity might want to issue floating-rate paper because it was financing assets that paid some indexed short-term rate, it could do an attractive swap—floating for fixed—or it thought it a good bet that, over the life of its borrowing, floating-rate debt would prove cheaper than fixed-rate debt.

A floating-rate MTN pays interest at a specified floating rate. That rate paid is a spread, positive or negative, off one of several well-recognized money market indices; these include LIBOR, the commercial paper index, the federal funds rate, the prime rate, and Treasury bills. On floaters, reset intervals are generally weekly, monthly, quarterly, or semiannually. The frequency with which interest is paid is established by the issuer in response to the issuer's needs and investor preferences. Floaters require a yield premium for longer maturities; while the buyer of a floater is not subject to interest-rate risk, she's subject to more risk with respect to credit and basis changes than she would be if she bought short-term paper.

It is the typical market investor who buys floating-rate MTNs. Some corporate floaters are issued with puts. An investor, such as a money fund, may be able to treat, for purposes of meeting restrictions on the maturities of the assets it may hold, an MTN with a put as having a maturity equal to its time to the next put date, rather than its time to maturity. This is attractive to a money fund that must keep tens of billions of dollars invested short term.

BANK DEPOSIT NOTES

Over time, the composition of the MTN market changed. The finance companies really started the market. Later, banks became, at both the bank and the holding-company level, big issuers in the MTN market (see Table 24.1).

Please, Quack like a Corporate Bond

Over the years, banks have frequently had a hard time convincing some institutional buyers to buy medium-term CDs. This is a cultural thing. First, most eligible buyers of medium-term, bank funding products are insurance companies. The latter typically buy only rated securities. A bank is rated, but a CD is not. What is the difference? For an answer, ask an insurance company. Also, when shown bank medium-term CDs, buyers of corporate paper ask questions that are difficult to answer intelligently, such as, "How big is the deal?" What can a dealer say other than, "Well, she's got \$80 billion of CDs outstanding; she's writing today; and she'll probably write more tomorrow, next week, or some time in the future." Buyers of corporate paper also want a prospectus.

So Wall Street said we will create *bank deposit notes*. We will call them the 3¹/₄s of 06 at par, they'll be double-A rated, and, of course, the paper will pay 30/360. This little drill did not come free; it cost maybe 15 to 25 bp. Perhaps half of those basis points went to the issuer to pay it to get its notes rated and to come up with some sort of offering circular (a stand-in for a prospectus); the other half went to the dealers who sold the paper.

When the Street created deposit notes, it operated on the assumption, which proved correct, that the average bond buyer believes that if it talks like a duck, walks like a duck, and quacks like a duck, it's a duck. However, decking out a bank deposit to look like a corporate security does *not* make it a corporate security.

The Banks: For Money, We Will Quack

For a bank, issuing deposit notes is simple. The bank pays a small fee to a rating agency to rate its issue. No documentation is required by any government body, but it has become traditional in these deals for a bank to provide an offering circular that gives the bank's current financials, that defines a deposit note, that tells where such a note ranks in terms of a bank's liabilities—that the buyer is a depositor, not a creditor, and so on. Such a circular is *much* less comprehensive than a prospectus, but it's something that the buyer can file in her drawer labeled "Prospectuses." Many banks will not put together any document, in which case the selling dealer may do a circular and get the bank's OK on what it says. Finally, a bank wanting to issue deposit notes negotiates with some group of dealers the terms on which it will offer its paper.¹

Advantages Offered to Issuing Banks

Naturally, a bank wanting to finance floating-rate assets with floating-rate liabilities finds that deposit notes have the disadvantage of paying a fixed rate. However, not to worry. A bank with a good credit rating can easily swap fixed-rate money raised in the bank deposit market into *sub-LIBOR funding*.

¹ A bank holding company issuing MTNs, as opposed to a bank issuing deposit notes, must register its issue with the SEC and make normal disclosure. Bank deposit notes, because they are a *bank liability*, are an *exempt* security.

A bank like Morgan with a top credit rating has, vis-à-vis other banks, a privileged access to funds: it can buy money more cheaply than other banks. How much more cheaply depends on the maturity of the funding. The average investor won't take less or much less for the honor of lending *overnight* to Morgan rather than to a less prominent bank. But if the loan is for five years, the spread between the rates at which the two banks can sell paper widens appreciably. Thus, the better a bank's credit, the lower the rate at which it can obtain floating-rate money by selling fixed-rate deposit notes and swapping fixed for floating.

For banks with good credit, the invention of the deposit note was a great deal. By using this new instrument, such a bank can reap a number of advantages: source funds in size from nontraditional buyers of bank paper; avoid reserve requirements; reduce its traditional tension between concern over liquidity and concern over interest-rate exposure; and finally, get funding at a rate below that at which it could roll 3- or 6-month liabilities in the Eurodollar interbank market.

Bank Notes

Banks pay an insurance premium to the FDIC on all deposit notes they issue. A bright banker at Republic New York once said, "We are a good bank. Why do we have to issue insured deposit notes? Why can't we just issue unsecured bank notes at the bank level, the way any corporation issues notes? On such plain vanilla notes, we won't owe the FDIC any insurance premium."

The product Republic New York pioneered is known as *bank notes*. Technically, such notes are unsubordinated liabilities with 2- to 5-year terms, and banks sell them strictly to institutional investors to whom deposit insurance means next to nothing, since (except in the case of pension funds covering more than one individual) it covers only the first \$100,000 of a deposit.

By selling over a billion dollars of bank notes, Republic New York saved itself hundreds of thousands of dollars in FDIC premiums. Other banks soon followed Republic New York's lead. In particular, Morgan Bank, Banker's Trust, and State Street Boston began selling bank notes. Today, with assessment rates between 23 basis points for well-capitalized banks and 29 basis points for undercapitalized banks, banks can still shield themselves from a significant amount of premiums by selling bank notes.

The issuance of bank notes did not escape notice by the FDIC. In November 1988, this agency proposed that its insurance premiums be extended to cover bank notes. The FDIC is naturally concerned about losing premiums. It is also concerned that, in a bank bankruptcy, bank notes might be held to be covered by FDIC insurance.

Bankers countered the FDIC proposal by saying that a bank note looks like a bond, pays like a bond, and so should not be treated like a deposit. Also, bank notes are sold only to sophisticated investors who presumably know what they are buying.

To a bank, an advantage of issuing a bank note at the bank level rather than at the holding-company level is that bank notes can be sold with a one-page offering circular, whereas bank-holding-company notes would have to be registered with the SEC. Also, any money raised at the holding-company level and funneled into the bank via holding-company deposits with the bank would be subject to FDIC insurance premiums.

DEALERS AS MARKET MAKERS

The principal dealers in the MTN and deposit note markets in 2005 in order of rank were Citigroup, Goldman, B of A, HSBC, Wachovia, JPMorgan, Merrill, and Lehman. Fees paid to these dealers averaged close to 30 basis points, a bit below the previous year.

The New-Issue Market

As noted, dealers in MTNs began by acting as agents, just as they do in the commercial paper market. They posted rates for their clients and took a fee, pretty well standardized, for what they sold. At the outset, they did not and were not expected to underwrite their clients' paper as do dealers who underwrite corporate bond issues.

Distribution has evolved differently in the bank deposit note market. Big banks like Morgan that have securities subsidiaries with distribution capability normally do not use dealers except when they want to do something big in a hurry. If such a bank needs to do, say, \$800 million in 2-year notes pronto, they will call around to the dealers to get bids. Such banks do not use the dealers on a continuing basis. It is the superregionals and others who lack good, national-market access who need dealers to represent them in the market and to guarantee the liquidity of their paper. No one worries about the liquidity of paper issued by Bankers Trust, Morgan,

or Citi. Other banks might be great institutions but are not household names. Such banks, therefore, generally use a dealer.

Ideally, the deposit note market works best on an agency basis. However, thanks partly to the operations of the big banks, distribution changed, and it is not unusual for new paper to be underwritten by the dealers. The old view was that when dealers committed to underwrite an issue, they would get a bigger commission for taking a bigger risk, whereas in the MTN market, dealers would work for less because they sold MTNs on an agency basis and thus had little risk. Yet, as more and more dealers began underwriting new MTNs, the lower commissions held.

Increasingly, the banks have used the MTN market on a bid-wanted basis. A large commercial may call three or four dealers and say, "We want to do \$800 million of deposit notes. What's your bid?" Maybe the bank has an interest-rate swap on the other side and wants to lock in a price. In any case, dealers often respond to bank requests or bids by simply underwriting the paper and taking it down. At this point, a large portion of the bank deposit note business is done on the basis of, "What's your bid for \$300 million?" There is no fee on such deals; the bank asks for an *all-in* bid or for a *bid at the net*. It is like bidding for T-bills.

Two things killed the market for medium-term, fixed-rate CDs. One was the deposit note market. The other was that dealers were not making money on bank CDs. Dealers would have banks asking them to bid on \$50 million of 3-year CDs. On such paper, a dealer can, if the market goes south, quickly lose lots of money. However, if the market moves in her favor, a dealer reaps no commensurate profit. The reason lies in the way CD yields respond to movements in the Treasury curve: if Treasury rates fall by 20 bp, medium-term CD rates may fall by only 10 bp; but if Treasury rates rise by 20 bp, CD rates may rise by 30 bp. Positioning medium-term bank CDs is thus a high-risk proposition, and dealers have lost lots of money doing it. For issuers, the medium-term CD market was always liquid in the sense that they could get a lot of paper out the door in a hurry by getting dealers to take it down; however, the market was never liquid in the sense that secondary trading of medium-term CDs was active.

As the deposit note market took off, dealers became less and less aggressive in their bidding for bank medium-term CDs. Now, the deposit note market is getting to look more and more like the old CD market: What is your bid for \$300 million? Little by little, the banks threatened to kill the goose that laid the golden egg.

The Secondary Market for MTNs

There is a small interdealer brokering of MTNs. Some of the corporate bond brokers will occasionally get involved, and there are several money market brokers who have tried to get into the business as well. Still, the MTN market, like the municipal market, is largely a buy-and-hold market.

MTNs are not actively traded like other securities where there are active screens and interdealer trades going on much of the time. “In MTNs, days can pass without a trade occurring in the brokers’ market,” noted one bank dealer. This, however, is not to say that MTNs lack liquidity. As noted, top dealers in MTNs go out of their way to make good bids on outstanding MTNs. As one dealer noted, “We have an ongoing reason to bid aggressively, and it is called *greed*. We want to develop the market.”

One factor that adds to the homogeneity of MTNs and thus to the liquidity that they do have is that an issuer may issue any day, but she often has two *fixed* coupon dates. (This means that new paper is likely to come with long or short first and last coupons.) Currently, some issuers, especially banks, wanting to couple MTN issuance with an interest-rate swap, have moved from fixed to flexible coupon dates. If they had, say, March and September fixed coupon dates and issued in May with an interest-rate swap that settled in May, they’d have an uncomfortable gap between March and May; hence, they’d rather issue in May with a May coupon date.

In an MTN program, what is flexible is the ability of the issuer to go into the market with different coupons and different maturity dates; what is standard is the method of accruing interest and the fixed coupon dates.

Dealers in MTNs recognize that a good secondary market always enhances what they can do in the primary market: providing good liquidity in the secondary market facilitates primary sales. Thus, much of the market is swap-driven: a dealer offers a customer the opportunity to swap an old piece for a new piece, maybe the opportunity to extend by swapping existing 2-year Fords for new 5-year Fords.

The success of the top dealers in trading MTNs has been that a lot of the philosophies that they used in trading money market instruments carried over well into the MTN market; in a sense, MTNs are an extension of the commercial paper market.² Thus, the philosophies of how dealers monitor programs, how they sponsor issuers, how they provide consistent

² It’s a measure of the success of the MTN market that MTNs have replaced a part of the traditional underwritten corporate bond market.

liquidity, how they have continuous offerings—all the things that made MTNs as successful as they are—came from the commercial paper market.

Obstacles to a well-developed secondary market for MTNs are plentiful owing to the nature of the security. For starters, there is no structured calendar for MTNs. This makes it difficult to establish a repo market for MTNs, creating barriers against shorting them, and this hurts liquidity. In addition, there is very little standardization in MTNs, because many MTNs are customized to fit an individual investor's request. This makes it difficult to establish deep and liquid markets.

Hedging Positions in MTNs

A dealer who holds a position in MTNs is subject to interest-rate risk. If she doesn't want to make a position play in MTNs, she can hold them and hedge that risk by shorting, on a duration-weighted basis, Treasuries, either cash or futures. The dealer's risk is then that corporate spreads may widen; if so, she loses money.

Alternatively, if a dealer shorts a swap (pays fixed and receives floating), she will achieve a better correlation between the fixed rates she is long and short. At least, with event risks aside, a common definition of swap spreads has been that they were synonymous with the spread of a single-A industrial to Treasuries. Because of the wide bid-offer spread in the swap market, swaps are not a cost-effective way for a dealer to hedge positions she expects to sell out shortly. However, if a dealer reasons that, as a core position, she is always going to have \$200 million of 5-years, \$200 million of 3-years, then for a portion of that it makes sense for her to put on a duration-weighted hedge using swaps. The dealer might put on a 5-year swap for maybe \$100 million and then let that 5-year become a 4-year and then a 3-year, and then maybe get rid of it. This approach reduces not only spread (basis) risk, but transaction costs as well. Every time a dealer shorts a Treasury and then has to buy it back, she loses as much as a 32nd. For a shop that maintains ongoing positions in MTNs, a cheaper way (from the point of view of transaction costs) to hedge that core position may be to book an interest rate: be the payer of fixed and receiver of floating to hedge fixed-rate MTNs.

MTNs VERSUS CORPORATE BONDS

In the beginning and in its purest form, the MTN market dealt in unsecured, fixed-rate, medium-term paper, typically sold on a continuous

basis by several dealers who acted on an agency basis. The MTN market, thus, contrasted with the corporate bond market in which issuers made discrete offerings of long-term paper that were underwritten by a syndicate of dealers.

Bells and Whistles

Over time, as the MTN market evolved, the distinction between the two markets blurred. For one thing, all sorts of bells and whistles were gradually added to MTNs. Today, an MTN could have a maturity at issue from 9 months to 30 or even 40 years. Also, MTNs have been issued that have call and refunding provisions, many of which have been issued by Fannie Mae and Freddie Mac; utilities have been issuing MTNs as first-mortgage bonds; thrifts, as noted, have issued collateralized MTNs; and some MTNs have been issued with floating rates. There have also been a number of structured products tied to equities, commodities, currencies, and inflation. Also, MTNs denominated in foreign currencies have been issued. When an MTN is denominated in a foreign currency, the currency of denomination is likely to reflect not what currency the issuer wants to borrow, but rather conditions in the swap market. Issuers are always driven by their all-in cost of funds; they will do whatever they need to get the lowest all-in cost of funds when swap opportunities and all relevant tax considerations are taken into account.

At this point, the industry's perception of MTNs is that they are really corporate bonds. That is how they are being marketed, as corporate bonds with a lot of flexibility, albeit minus the liquidity in the secondary market seen particularly in some of the larger benchmark issues of the corporate bond market.

Remaining Distinctions between MTNs and Corporate Bonds

At this point, one might well ask: What remaining differences, if any, are there between MTNs and corporate bonds? And why might an issuer prefer one over the other?

Since almost every conceivable bell and whistle has been added to one MTN issue or another, the principal remaining difference between corporate bonds and MTNs is that the former are almost always underwritten deals, whereas most MTNs are sold principally by dealers on an agency basis.

Whether a big issuer, like a commercial bank, will at a given moment choose to do an underwritten deal or MTN depends a lot on market environment. Nine times out of 10, an unwritten deal is syndicated. Such a deal guarantees the issuer a fixed rate and a fixed sum. Thus, an issuer will go to the corporate bond desk when it wants to lock in a rate for a sizable amount. The issuer uses an MTN program when it wants to dribble out its issue.

At a given point, the MTN market may be saying, “OK, XYZ Bank, today, if you just post the rate 25 over in two years, you will get some money, but you may not get a lot.” At the same time the underwritten market may be saying, “For 30 over, you can get \$300 million or \$500 million.” The issuer’s response might be that she does not need all that money today, so she will go with MTNs. However, if the issuer thinks that rates are going up, she will go to the corporate bond desk and say, “Guys, I want my \$200 million today.” How an issuer uses the two markets is really a function of size, timing, what the issuer feels she wants to accomplish, and when she wants to do so.

Transaction cost is another factor separating the MTN from the underwritten market. It is not cost-effective for an issuer to do an underwritten deal in small size. If an issuer wants to do a small tranche—maybe she is doing a swap on the other side or she has an asset she wants to match fund—she can go to her MTN dealer and ask the dealer to bid as principal on that tranche. By being willing to make such bids, the dealer adds to the issuer’s flexibility.

Looking to the future, dealers anticipate that the growth of issuance of MTNs by industrial and utility companies will be explosive. Once such issuers get out of the bullet, underwritten, 30-year-maturity frame of mind and set up an MTN program to complement their underwritten issuance, they end up using MTNs to meet a lot of their ongoing funding needs; typically, such issuers do numerous *reloads*: they file to do new programs and become frequent issuers.

EURO MTNs

In 1986, dealers began the road work—educating potential issuers and investors—required to launch a market in Euro MTNs. (In this section, “Euro” refers to MTNs sold by any entity outside of their home country, but in most cases we are referring to MTNs denominated in dollars and sold by U.S. entities.) Between that year and the outset of 1989, outstandings of Euro MTNs grew from the lowly total of \$350 million to \$4.4 billion. By 2003, yearly issuance was approaching \$1 trillion.

Issuers of Euro MTNs include sovereigns, bank holding companies, other financial companies, and European and U.S. corporations. For structured products, investors demand strong credits because the structured products already entail some degree of risk inherent in the way that they are linked to equities, inflation, or whatever. Top issuers in recent years have included Rabobank in the Netherlands, Lloyds TSB, the European Investment Bank, and the Royal Bank of Scotland.

For a U.S. company such as Fannie Mae, there are advantages to being able to offer both domestic and Euro MTNs, making the choice a cost-driven decision. Because of its international name, Fannie Mae might, on a given day, find that it could save 10 bp by issuing Euro rather than domestic MTNs. If it does, it would go the Euro route. In calculating which route is cheaper, a borrower includes in her all-in cost the coupon, fees, regulatory costs—the works.

In talking to a client these days, a dealer always proposes that a suitable client set up a global MTN program and thereby have all possible borrowing avenues open to it. Most U.S. companies start with a domestic MTN program. The extra cost of then adding a Euro program is minimal. In particular, the rating agencies charge little more for rating a two-part program than for rating a one-part program, just a few basis points, and a company that does this will have its Euro MTN program up and running for the day it wants to use it.

The four dominant types of investors in Euro MTNs are central banks, fund managers, insurers, and other financial institutions; corporates are small buyers of such paper. In the structured market, high net-worth individuals, financial institutions, and retail investors are the main buyers out of Asia, the Middle East, and from customers of private Swiss banks.

Citigroup, Barclays, and Deutsche Bank are the dominant dealers in the European corporate bond market, followed by ABN Amro, HSBC, BNP Paribas, and the Royal Bank of Scotland. By design, dealers, in seeking to create a market in Euro MTNs, have followed the pattern established in the highly successful U.S. MTN market.

At issuance, dealers act as agent; and for this, they collect a fee of around a few bp for every six months of maturity, or generally around 20–40 basis points. This fee structure, which is attractive relative to what a dealer might get on a sale of Euro commercial paper, means that dealers are making money distributing Euro MTNs. For both issuers and investors, that's desirable: the secondary market in Euro MTNs, which now has relatively good liquidity, will stay that way only if dealers, because they are

making money, have an incentive to maintain ever green their commitment to provide liquidity to investors wanting to sell.

The substantial increase in Euro MTN issuance has created a very large pool of securities that investors can choose from to customize their portfolios to meet their array of needs with respect to maturities and cash flows. Like the U.S. corporate bond market, Euro MTNs have followed the pattern set in the United States: MTNs displacing either forms of under-written debt to the benefit of both the investor and the issuer.

REVIEW IN BRIEF

- Medium-term notes (MTN) are a securities success story dating back to the 1980s when U.S. companies needed to bridge the gap between short-term funding in commercial paper and the corporate bond market.
- At the end of 2004, there was \$639 billion of MTNs outstanding. Total issuance that year was \$295 billion.
- SEC Rule 415 permitted issuers to file shelf-registrations, making it possible for them to avoid the cost burdens associated with continuously having to refile every time they issued new securities, experienced a material change in condition, or had new financials.
- MTNs have evolved from fixed-rate, medium-term, unsecured corporate obligations into a product with greater flexibility. Today, “medium” is a misnomer; maturities now extend as far as 30 years.
- Because of their flexibility, investors can customize MTNs to suit their portfolio needs.
- Yields on fixed-rate MTNs are always quoted at a spread off Treasuries, and their spreads tend to behave similarly to spreads in the corporate bond market.
- Although there is a secondary market for MTNs, investors tend to buy and hold the securities, the customized nature of which makes it difficult for there to be any regularity or predictability to the issuance calendar.
- The Euro MTN market has grown substantially, and many companies find it advantageous to be able to offer either domestic MTNs or Euro MTNs.
- A structured note market has also developed in the Euro MTN market.

Municipal Notes

The term *municipal securities* is used in blanket fashion by the Street to denote all debt securities issued by state and local governments and their agencies. The agencies include school districts, state universities, sewer districts, municipally owned utilities, and authorities running toll roads, bridges, airports and seaports, and other transportation facilities. In the middle of 2006, there were \$2.3 trillion of municipal securities outstanding.

Municipal securities are issued for various purposes. Short-term notes are typically sold in anticipation of the receipt of other funds, such as taxes or proceeds from a bond issue. Their sale permits the issuer to cover seasonal and other temporary imbalances between expenditure outflows and tax inflows. In contrast, the sale of long-term bonds is the main way that state and local governments finance the construction of schools, hospitals, roads, bridges, and other capital projects. Bond issues are also used to fund long-term budget deficits arising from current operations.

Municipal securities fall into two broad categories: general obligation securities and revenue securities. On *general obligation securities* (GOSs), payment of principal and interest is secured by the issuer's pledge of its full faith, credit, and taxing power. Usually, this means that the securities are backed by all the issuer's resources plus its pledge to levy taxes without limits on rate or amount. In some states and localities, such a pledge can be made only on a qualified basis because the issuer's taxing power is limited to some maximum rate. GOSs of such issuers are called

limited-tax securities. GOSs account for about one-third of all municipal securities outstanding.¹

On *revenue securities*, payments of interest and principal are made from revenues derived from tolls, user charges, or rents paid by those who use the facilities financed with the proceeds of the security issue. An example would be bonds used to finance construction of a toll bridge and secured by toll collections.

TYPES OF MUNI SHORT-TERM PAPER

Our focus in this chapter is on short-term, tax-exempt municipal paper. It's perhaps misleading to title this chapter "Municipal Notes" because, today, municipal issuers sell to investors *two* quite distinct types of short-term paper. The first type is traditional, short-term, fixed-rate *notes*, such as *tax anticipation notes (TANs)* and *bond anticipation notes (BANs)*. The second type is what's called variable-rate demand *bonds*, which are long-term securities on which the rate paid is reset periodically. On each reset date, investors in such paper have the right to put it back to the issuer's marketing agent; thus, such paper is, from the investor's point of view, short term.

SHORT-TERM, FIXED-RATE NOTES

Traditional, short-term, fixed-rate muni notes typically have an initial maturity of one year or less. Such notes come in several flavors.

Tax Anticipation Notes (TANs)

TANs are issued by municipalities to finance their current operations in anticipation of future tax receipts. Usually, they are general obligation securities. *TANs* are often sold early in a municipality's fiscal year ahead of expected increases in tax receipts.

Revenue Anticipation Notes (RANs)

RANs are offered periodically for much the same purpose as *TANs* except that the revenues anticipated are not general tax receipts. *RANs*, like *TANs*,

¹ Chris Downing and Frank Zhang, "Trading Activity and Price Volatility in the Municipal Bond Market," *Finance and Economics Discussion Series*, Board of Governors of the Federal Reserve System, September 2002.

are usually GO securities. RANs are generally issued to finance large projects such as stadiums or toll-based highways.

Bond Anticipation Notes (BANs)

BANs are sold to get interim financing for projects that will later be funded long term through the sale of bonds. Normally, payment on *BANs* is made from the proceeds of the anticipated bond issue. *BANs* are usually GOs.

Tax and Revenue Anticipation Notes (TRANS)

Issuers sometimes also sell *TRANS*, which are a hybrid of *TANs* and *RANs*. Also, the University of Missouri has even sold *FANs*, fund anticipation notes.

Grant Anticipation Revenue Vehicles (GARVEEs)

GARVEEs are sold in anticipation of monies expected to be received by the U.S. government. In recent years, federal law has expanded states' ability to tap federal-aid highway funds as a source of repaying debts. States can now pledge a share of future federal-aid highway funds toward payment of debt obligations. While some debt service payments have been eligible for reimbursement from federal-aid highway funds since the beginning of the modern Federal-Aid Highway Program in 1956, this opportunity was of limited practical use. For example, prior to 1995, states could use their apportioned federal-aid highway funds to repay only the principal component of debt service on certain categories of projects, and interest costs were eligible for reimbursement only for some interstate projects.² In 1995, laws were amended to expand the types of debt-related costs eligible for federal-aid reimbursement to include interest expenses for all projects, debt issuance costs, and the cost of purchasing commercial bond insurance.

Moving to Book Entry and Real-Time Reporting

As with other fixed-income securities, municipal notes used to be issued as *bearer notes* (Figure 25.1). For securities of such short duration, registration wasn't worth the trouble and cost involved.

In 1982, a change in the federal tax code subjected coupon interest on municipal securities issued after 1982 to federal taxation unless those

² Federal Highway Administration, *Innovative Finance Primer*, Chapter 3, p. 15, April 2002.

Reporting System (RTRS) if the dealer: (1) does not have the CUSIP number and indicative data of the issue traded in the securities master file used by the dealer to process trades for confirmation, clearance, and settlement; (2) has not traded the security in the previous year; and (3) did not act as a syndicate manager or syndicate member for the security (“three-hour exception”). For transactions on a when, as, and if issued basis (“when-issued” transactions), the three-hour exception will expire on December 31, 2007, and for all other transactions (“secondary market” transactions), the three-hour exception expired on December 29, 2006.³

Going electronic has many obvious benefits to all those involved in transacting municipal securities. It also saves the issuer the cost of printing individual certificates. In 1986, for example, printing costs for a bond issue ran between \$2 and \$4 per \$1,000 of principal.

Other Characteristics

The minimum denomination in which municipal notes are generally issued is \$5,000, although some issuers may impose a higher minimum denomination, usually \$100,000. Additional purchases are usually the same as the minimum denomination. The choice on the minimum depends on whether the market for the issuer’s securities is likely to comprise some individuals, only institutions, or only very large institutions. Thus, part of the dealer’s job is to advise an issuer as to where the market for his securities is and what minimum denomination he should set. For a municipality experiencing difficulty selling its notes, dealers might suggest that the entity lower the minimum denomination on its notes so they could appeal to individuals. This is good advice from dealer to client, but also looks like a conspiracy to defraud the little guy. Thus, dealers shy away from suggesting that a borrower with a credit problem issue in small pieces.

Most municipal notes are *interest bearing*, but they may also be issued in *discount* form. At times, discount notes can be sold at a lower rate than interest-bearing notes, but usually the difference is small. One reason for the lack of popularity of discount issues is that if a municipality authorized to borrow \$400 million gets only \$394 million by selling discount notes, the public will think that the municipality has not exhausted

³ Adopted from “SEC Approves proposed Rule Change to MSRB Rule G-14 RTRS Procedures, Paragraph (a)(ii)(C) to Extend the Expiration Date of the Three-Hour Exception,” MSRB Notice 2005-62 (December 22, 2005).

its borrowing authorization; that can pose problems if the municipality needs to borrow more money. A second reason why muni notes aren't sold in discount form is that the price of a muni discount note would be more volatile than that of an interest-bearing note. A third reason muni issuers have resisted issuing zero coupons is that they might create tax complications for investors; the maximum tax-exempt income an investor may earn on a muni discount note is the discount at issue.

Interest on municipal notes that bear interest is normally paid at maturity. Whereas muni bonds all accrue interest on a 30/360 day basis, issuers of muni notes use different bases: 30/360, actual/360, and actual/365.⁴ Muni discount notes are redeemed at face value at maturity.

Measured in terms of participating issuers, the municipal bond market is broad—something like 50,000 entities issue municipal securities. A community's access to the municipal securities market depends on its credit rather than on its size or the size of its issues. Most municipalities do not borrow from tomorrow what it spent yesterday; and those that avoid this practice have easy access to the municipal market.

The amounts and types of short-term borrowing in which a municipality may engage are controlled by state law. California sets the rules for how Los Angeles County may borrow, and New York State sets rules for how New York City may borrow. Some states' laws on local borrowing are more liberal than others.

VARIABLE-RATE DEMAND OBLIGATIONS

A *variable-rate demand obligation* (VRDO) is a long-term security with periodic rate-reset dates on which the investor may put the paper back to the issuer's trustee at any time with specified notice (e.g., seven days). The put price is par plus accrued interest. VRDOs are issued to finance some sort of project: sewers, hospitals, public educational facilities, and so on. "Usually, VRDOs are issued," noted one marketing agent, "for general capital purposes. We do them for colleges, universities, hospitals—virtually any kind of issuer that has the authority to enter into a variable-rate obligation." In 2005, data from the Bond Market Association and Thomson Financial showed that total issuance of VRDOs was \$65 billion,

⁴ Different bases for accruing interest are described in Stigum and Robinson's *Money Market & Bond Calculations* (New York: McGraw-Hill, 1996). The method of accrual can significantly affect true yield on short notes carrying a high coupon.

which was double the level seen seven years earlier. In addition, there were over 23,000 active VRDOs remarketed by over 80 dealers. The total amount outstanding included about \$250 billion of AMT VRDOs, \$27.13 billion taxable VRDOs, and \$71.15 billion AMT VRDOs.

The Mechanics

Most VRDOs are long in term, 20, 30, or even 40 years, but they are considered short-term securities because their yields reset often and because of their put feature. The rate paid on them is reset at specified intervals, usually daily or weekly, but there are also weeklies, monthlies, semiannuals, and annuals available. Also, there is a commercial paper mode in which the reset period can be anything from one day (i.e., daily) to over 360 days. The reset period is customized by the investor. A VRDO with a six-month rate reset is called a *6-month put bond*; there is also an *annual put bond*.

Backups for VRDOs

Typically, a VRDO is backed with a credit line that ensures that there will be sufficient liquidity to meet any and all puts by investors. If an issuer of a VRDO doesn't have top credit, it may also back its paper with a bank *line of credit* (LOC), or a *standby bond purchase agreement* (SBPA). A bank writing an LOC is writing a credit guarantee: it commits itself to pay off an issuer's bonds should the issuer default. Thus, the credit on such paper is regarded as being that of the bank writing the LOC rather than that of the issuer. SBPAs are typically provided by commercial banks and then insured by a municipal bond insurance company. In fact, credit agencies such as Standard & Poor's base their credit ratings for tender obligations on VRDOs on third-party liquidity facilities such as LOCs and SBPAs. There have been some major issuers of VRDOs that have indicated to Standard & Poor's that they would rather use their own liquid assets in combination with liquidity facilities as a way of providing liquidity backup. They argue that liquidity facilities are often expensive and difficult to administer. Standard & Poor's assigns dual ratings, such as "AA/A-1+," to VRDOs, with the left side the "credit" rating on the bond and the right side the "liquidity" rating. The liquidity rating is assigned only if the VRDO has some form of liquidity support that meets the requirements of the bond structure. Issuers often have to renew their LOCs, which usually have an initial term of three to five years.

Pricing

For a fee, one that is smaller than other tax-free money market instruments, a VRDO issuer's marketing agent will price and sell its paper. The pricing of VRDOs has evolved over time into an increasingly flexible mode. Initially, such paper was priced as a percentage of prime. This created periods when the rate was unfavorable for the issuer and other periods when the rate was unfavorable for the investor. Then, for a time, VRDO paper was priced at some percentage, 90% to 120%, of the average (based on a survey of various dealers) 30-day, tax-exempt commercial paper rate that Munifax published daily at 9:30 a.m. There were, however, times when that approach worked poorly from the marketer's point of view. So most marketing agents eventually moved to a flexible approach: now variable-rate paper pretty much sets its own rate, based on the supply of and demand for it, and prices are set through a remarketing process or according to a specific index created by the Bond Market Association. A complicating factor in pricing short-term muni paper is that the market for it is highly technical and depends a great deal upon the varying tax rates and fiscal situations of the issuers.

The Put

On VRDO paper, the rate is set daily, weekly, or whatever. VRDOs are issued at par, and investors in VRDOs can put their bonds back to the marketing agent at par, as long as the agent is given sufficient notice. The more frequent the reset, the less likely it is that the put feature is utilized. Whenever paper is put back to the agent—there are various deadlines—its sales force tries to resell that paper the same day. If its sales force is unsuccessful, two things can happen. The marketing agent will position and finance the paper until it is sold, thereby providing the funds necessary to repay the investor exercising the put option. Or less commonly, the marketing agent will go to the issuer's backstop bank; it would generally be in the year-end pressure periods that the marketer might "drop on a backstop."

Bonding Out

Typically, in the indenture of a VRDO, there is some sort of *call notice*, maybe a 1-week, 2-week, or a 30-day call notice. This feature permits the issuer to notify the holders of its bonds that they will be called to be fixed out. An issuer might find it attractive to call its VRDOs and fix them out,

sell them at a fixed rate to maturity, if long-term rates fell to what it viewed as an attractive level.

When a VRDO issuer calls its bonds, investors will say, “Well, I’m not going to own these notes in a month, so I’ll put them back now and find something else to fill me.” Consequently, an issuer’s marketer will typically end up holding such paper the last week before it’s bonded out. The marketer continues to reprice the paper on each reset date, which may be daily, right up until the date it becomes a long bond; at the same time, it canvasses its customer base to assess interest in the bond as a long coupon.

Advantages to the Issuer

In selling VRDOs, a principal concern of the issuer is its all-in cost of borrowing. On a VRDO, this will equal the rate paid to the investor, plus a marketing fee, plus maybe a small amount for a liquidity backstop line, plus up to 10 bp for issuing costs. This turns out to be on average a quite attractive rate over time.

The natural and perhaps cheaper alternative for an issuer would be to simply sell tax-exempt commercial paper, and a number of tax-exempt issuers do so. The principal reason an issuer chooses VRDOs over commercial paper is *reissuance risk*. Over the muni market, the fear always hangs that Congress will diminish or eliminate the tax-exempt status of municipal securities and that the recent low interest-rate environment might change. If an issuer is concerned about reissuance risk—fears that at some future point securities issued by it may be deemed to be taxable—and if it consequently wants to ensure (to the extent possible) that its securities would, in that event, be grandfathered, it will want to issue a long maturity. With commercial paper, each time the paper rolls over, it is deemed to be matured, so such paper might be grandfathered but only for 30 days, not for 30 years. With a VRDO, the issuer has a 20- or 30-year maturity but, in terms of rate paid, the VRDO brings him down the yield curve and makes his rate very competitive with commercial paper rates.

Another advantage for the issuer of a VRDO is the great flexibility with which covenants are written today. Many of the newer indentures for these securities allow the issuer to flip from a daily repricing to a weekly repricing or to what is called a commercial paper mode—he can reprice different pieces of his issue to different maturities, out to 270 days. Also, he often has a conversion feature that permits him to convert the issue from floating rate to fixed rate for the remainder of its life.

One of the most important advantages of VRDOs is that they can be issued at an attractive interest rate compared to other long-term securities, thanks to the variable rate feature. In essence, the issuer can sell long-term debt at short-term rates, which in most environments means that the interest rate paid by the issuer will be lower than if it sold other types of long-term debt. Figure 25.2 shows the Bond Market Association's (BMA) municipal swap index, the main proxy for VRDO rates and the index used to reset most VRDO rates, during the period 2000 through 2006. As the chart shows, yields on VRDO securities were relatively low during the period, comfortably below the 5.05% average seen for the U.S. 30-year bond during that period (muni bond rates tend to average between 75% and 100% of Treasury rates, depending upon the type of bond). This means that issuers of VRDOs were able to significantly lower their cost of long-term borrowing by choosing VRDOs over other types of long-term debt.

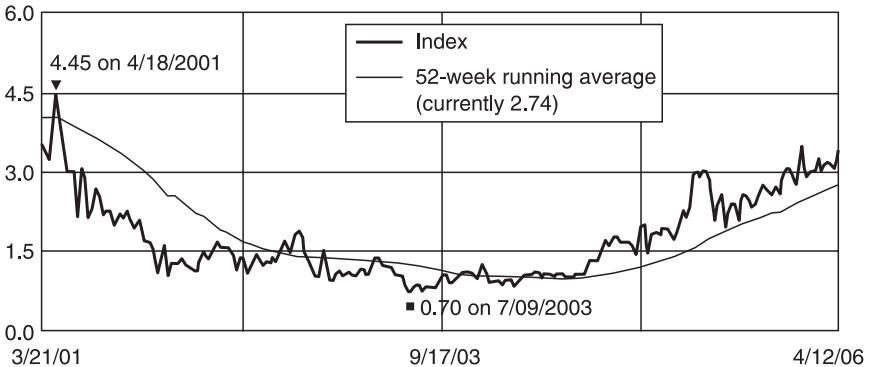
A few taxable VRDOs have been done, and for certain purposes they are useful. However, once a municipal body starts issuing paper that by law is taxable, the reissuance question becomes moot, and it generally uses commercial paper.

Advantages to the Buyer

VRDO paper has a big appeal to investors who want short-term, tax-exempt paper, the demand for which far exceeds the amount of fixed-rate,

FIGURE 25.2

Bond Market Association's municipal swap index



Source: Bond Market Association

short-term notes that muni bodies sell. Tax-exempt money funds are major buyers of VRDO paper, owning close to 70% of all VRDO paper because, in calculating the average maturity of the securities in their portfolio, they can treat a VRDO as having a current maturity equal to its time to reset—as opposed to its time to maturity. Moreover, because VRDOs qualify under the SEC’s Rule 2a-7, which contains rules and regulations that apply to money market funds, fund managers can use VRDOs to meet their goals of maintaining stable asset values and ample liquidity. Indeed, although between reset dates the liquidity of VRDO paper may be poor in the secondary market, on every put date a VRDO can be sold *at par*.

TAXATION

The most important advantage of municipal securities to the investor is that interest income on them is exempt from federal income taxes and usually from state and local taxes within the state in which they’re issued. The federal tax exemption used to be thought to have a constitutional foundation, the courts having ruled that the constitution bars the federal government from imposing on the states without their consent any taxes that would interfere with their governmental functions. Whether federal taxation of interest paid on municipal securities would in fact constitute such interference used to be unclear, however. Then, in May 1988, the U.S. Supreme Court ruled that Congress could, at will, revoke the traditional tax exemption enjoyed by municipal issuers. This caused brief panic in the muni market, but in the end, most people concluded that Congress was unlikely to do more than whittle further at the edges of and at any new abuses of the municipal tax exemption.

The states have always reciprocated the federal exemption by exempting income on Treasury securities from state taxation. Thus, state and federal taxation of interest income on each other’s securities is characterized by *reciprocal immunity*.

1986 Tax Reform Act

In a 1982 tax act, Congress required the registration of muni bonds, since the most obvious demand for bearer bonds came from people seeking to evade capital gains and inheritance taxes and from people waiting to invest, in untraceable bonds, cash they had obtained either illegally or by evading taxes.

Pressures for Change

Later, pressure built up from several sources for further limitations on the municipal tax exemption. First, the federal government was under pressure to reduce its huge budget deficit, and tax-exempt borrowings stood out, as always, as a big revenue loser for the Treasury. Second, pressure for change really heated up in 1983 when muni borrowings for nontraditional purposes began to explode. In particular, Congress took a dim view of muni bodies borrowing tax-exempt funds to provide cheap financing for *private-purpose* projects such as building factories to create local jobs; building pollution-control facilities, stadiums, and convention centers; and funding mortgage subsidies and low-cost loans to farmers and small businesses. Congress wanted to force municipalities back to issuing tax-exempt bonds strictly to finance traditional *public-purpose* activities such as road building, sewers, and fire-fighting facilities. Yet another municipal ploy that raised hackles in Washington was the issuance by muni bodies of tax-exempt bonds to earn arbitrage profits. For example, a city would issue tax-exempt bonds to finance, say, low-income housing; invest the proceeds in Treasuries paying 200 bp over its borrowing cost; and then, after receiving millions in easy profits, redeem its bonds without putting up even one unit of housing.

Provisions of the Act

The 1986 tax act imposed severe limitations on the issuance of muni bonds to finance private-purpose activities; these included shutting out America's top private universities from the tax-exempt market. The act also required muni issuers to rebate to the Treasury any arbitrage profits they earn, except in quite restricted situations. Finally, the act ended the interest deduction that commercial banks had previously enjoyed when they borrowed to finance their holdings of tax-exempt securities.

Pain on Wall Street

The restrictions imposed by the 1986 tax act were widely anticipated. As a result, there was a bulge of muni-bond issuance in 1985 and a sharp drop-off thereafter. Thus, final enactment of the 1986 tax measure, together with high interest rates, forced city and state financings to fall, between September 1985 and November 1987, by 50%. This in turn caused a dearth in underwriting business for the Street, and at many dealers, losses in once-profitable muni departments.

To the surprise of many, Salomon Brothers, the leading muni dealer at that time, abruptly abandoned the muni business in October 1987. It was followed by L.F. Rothchild, Bank of America, Continental Illinois, and others; even those dealers who stayed the course slashed personnel in their muni departments, which nationwide had employed more than 15,000 people. Still, most key players viewed it as folly to quit dealing in munis; in their view, the ever-growing need to improve local infrastructures and looming cutbacks in federal spending were likely to sharply increase local government dependence on the tax-exempt market, as evidenced by the growth of the municipal bond market, which doubled in size during the 1990s.

Gain on Main Street

Wall Street's pain caused a noticeable gain for Main Street borrowers. With new issuance way down, competition by dealers for municipal underwriting deals became ever fiercer. Issuers found themselves in the catbird seat; and as a result, the downtrend in underwriting fees sharpened. It's estimated that between 1984 and the fall of 1987, average underwriting fees on an issue rated A by Moody's fell from \$25.57 per \$1,000 to \$15.03 and that, across the board for all categories of munis, underwriting fees fell by 50%.

Taxable Munis

After passage of the 1986 tax act, some municipalities began to issue taxable bonds to meet taxpayer demands for things such as low-income housing, health-care facilities, and facilities for the disposal of hazardous wastes. It pained them, however, to have to pay high taxable rates. In response to that pain and to drum up business, dealers initially tried to come up with all sorts of gimmicky ways for muni issuers to sell taxable debt: quasi-flaky proposals such as financings linked to junk bonds and taxable munis denominated in yen. "The only thing they [the proposed new issues] had in common," noted one municipal finance officer, "was that no one had tried them before." Eventually, investment bankers toned down their proposals, since what went down best with both investors and issuers was plain vanilla, taxable muni bonds.

Equivalent Taxable Yield

To compare yield on a municipal security with that on a taxable security, an investor must compute the *equivalent taxable yield* on the

TABLE 25.1

Equivalent taxable yields for selected marginal tax rates

Municipal Coupon (%)	<i>Investor's Federal Tax Bracket (marginal tax rate)</i>		
	15%	28%	33%
2.0	2.35	2.67	3.08
2.5	2.94	3.33	3.84
3.0	3.53	4.00	4.62
3.5	4.11	4.67	5.38
4.0	4.71	5.33	6.15

municipal security; that is, the *taxable* return that would leave him with an *after-tax* return equal to the return paid on the municipal security. For example, for a corporation taxed at a 35% marginal rate, the equivalent taxable yield on a new muni note offered at 4% would be 6.15%.⁵

The exemption from federal taxation granted on income from municipal securities applies only to interest income paid by the issuer either directly or indirectly in the case of discount notes. If, because of the rise in interest rates, a municipal security trades below its issue price, the buyer of this security will receive not only tax-free interest income, but a taxable capital gain as well. Consequently, a municipal security's equivalent taxable yield is lower, relative to its quoted yield to maturity, if the security is selling at a discount than if it's selling at par.

Table 25.1 shows the relationship between yield on a tax-exempt municipal and equivalent taxable yield for investors in selected federal tax brackets. The figures in the table are based on the assumption that the securities are trading at par; also, no account is taken of possible state taxes. As the figures show, the value of the tax exemption granted on income from municipal securities is greater the higher the investor's tax bracket. For example, the equivalent taxable yield on a municipal security paying 3% is only 3.53% for an investor whose marginal tax rate is 15%, but 4.62% for an investor whose marginal tax rate is 35%. Thus, the muni market attracts highly taxed investors.

An interesting feature of the muni market is that individual issues tend to have *regional* markets in which they sell best. One reason is the state and

⁵ For the formula, see the appendix to this chapter.

local taxes on income. A municipal security issued by New York City offers a much higher equivalent taxable yield to an investor who lives there and must pay high city and state income taxes than it would to an out-of-state investor. A second factor creating regional markets for municipal securities is the tax on intangibles that many states levy. Normally, this tax isn't applied to local issues. For example, about half of U.S. states tax Social Security benefits. In other cases, there are a small number of states that allow no exemption or tax credit for pension and other retirement income.

Tax Reform

Because interest income on municipals is tax-exempt, a wealthy individual can earn a huge tax-free income by investing in municipals, and many wealthy individuals do just that. Periodically, this practice leads to calls for tax reform, in particular for ending the tax exemption on municipal securities. These calls are countered by pressure from state and local governments to maintain the present system, which permits municipal issuers to borrow more cheaply than they otherwise could.

The current system of reciprocal tax immunity amounts to an expensive, inefficient federal subsidy of state and local borrowing. In the past it has been estimated that every \$1 saved in borrowing costs by municipal issuers costs the federal government \$2 to \$3 in lost tax revenue. In early 2006, the Congressional Budget Office estimated that the Treasury would lose \$27 billion in revenues in its 2006 fiscal year because of the tax-exempt status of municipal bonds. The current system also *narrows* the market for municipals because only investors taxed at high marginal rates—and that leaves out many institutional investors—have an incentive to invest in municipals. A possible alternative to the present system would be for Congress to end the federal tax exemption for municipal issues and provide a federal subsidy for such issues. Proposals of this sort have been made but never enacted. The rationale in part is that the lost revenue seems a small price to pay to have roads, schools, housing, transportation systems, and so forth fully financed by the thousands of municipalities that use the municipal bonds market.

CREDIT RISK AND RATINGS

Municipal securities, unlike governments, expose the investor to credit risk. Consequently, for a municipal issue to sell in the national market,

it must, like commercial paper, be rated. The major providers of this service are Moody's and Standard & Poor's, followed by Fitch.

In rating an issue, a rating service's main concern is whether the issuer will be able to make promised payments of interest and principal. The first thing a rating service looks at is the pledge behind the issue; it may be a general-obligation pledge, a limited-tax pledge, a revenue pledge, or a mix of these. In the case of GO issues, the relationship between the issuer's total debt burden and its tax base is crucial. In the case of municipal bonds, projections into the future necessarily play a major role in any rating; the rating service must ask how the community issuing the security is likely to fare over time: Is it growing? Does it have a diversified economy? Is local government well managed? In the case of revenue bonds, the main focus is on whether the facility being financed—be it a toll bridge or a college dorm—provides a service that the public will purchase in sufficient quantity to permit the issuer to handle its debt.

The information and analysis that go into rating a municipal bond are summarized in a shorthand way by assigning to the issue one of several possible ratings; those given by the national rating services are listed in Table 25.2.

TABLE 25.2

Ratings given by Moody's and Standard & Poor's on municipal bonds

Rating Interpretation	Moody's*	Standard & Poor's†
Strongest creditworthiness	Aaa	AAA
Very strong creditworthiness	Aa	AA
Above-average creditworthiness	A	A
Average creditworthiness	Baa	BBB
Below-average creditworthiness	Ba	BB
Weak creditworthiness	B	B
Very weak creditworthiness	Caa	CCC
Extremely weak creditworthiness	Ca	CC
The weakest creditworthiness	C	C

*Bonds of the highest quality within a grade are designated as A-1 and Baa-1. Since October 1996 Moody's has applied numerical modifiers 1, 2, and 3 in each generic rating classification from Aa to B. The modifier 1 indicates that the issue ranks at the higher end of its generic rating category, the modifier 2 indicates a midrange ranking, and the modifier 3 indicates that the issue ranks at the lower end of its generic category.

†For rating categories AA to BB, a plus sign is added to show high relative standing, a minus sign to show low relative standing.

Municipal *notes* are rated separately by Moody's in order of declining creditworthiness: Moody's investment grade (MIG) 1, MIG 2, MIG 3, and MIG 4 (adequate quality). Speculative quality is denoted as SG. S&P rates muni notes SP-1 (best quality) to SP-3 (speculative).

Investors view the ratings assigned to municipal securities as important indicators of quality and risk, and ratings affect the yields at which notes trade. Direct comparisons are, however, difficult because the yield on a muni note depends on so many things: what type of note it is (TAN, BAN, RAN, or TRAN, for example); how much paper the issue has in the market; and whether the paper is "double tax-exempt," that is, whether it offers local investors exemption from high state and local taxes.

Credit Enhancements

Investors in munis tend to be risk-averse; they demand quality and are willing to give up yield to get it. Consequently, a muni note issuer, if it can't get a MIG 1 rating on its own, will buy a credit enhancement to get that rating, and most issuers choose some form of credit enhancement. In the first nine months of 2005, for example, 65.7% of new issuers used some form of credit enhancement, the vast majority of which (89.8%) was in the form of bond insurance, according to the Bond Market Association.⁶ When the concern of the rating agency is not over the issuer's credit but over its ability to roll or refund the notes being rated, a committed facility from a bank may suffice for an issuer to get a MIG 1 rating on its paper. Such a facility takes away market risk—the bond market is terrible when the notes mature; it does not eliminate credit risk because a committed line doesn't require a line bank to bail out a borrower in default. Committed facilities have been used by many muni-note issuers in recent years because the cost of a backstop from a bank was less than the difference in yield between MIG 1 and MIG 2 paper. When the concern of the rating agency is over the issuer's credit, an LOC is called for. Louisiana would be an example of an issuer that needs an LOC to get a MIG 1 rating for its notes.

A rating is not a once-and-for-all affair. Ratings on individual issues are constantly upgraded or downgraded in light of changes in the position of the issuer. Sometimes, instead of changing its rating of a given issue, a credit rating agency might withdraw its rating altogether. Generally, what this

⁶ The Bond Market Association, "Municipal Bond Credit Report," January 2006.

means is that circumstances surrounding the issue have become so uncertain that a meaningful rating cannot be given. It may also reflect the rating service's belief that adverse factors creating the uncertainty may be temporary.

In evaluating a muni's credit, investors often look, whether they're investing in notes or VRDOs, to the rating given to the issuer's long-term debt—just as investors in commercial paper consider not only the rating assigned to the issuer's commercial paper, but also the rating assigned to its bonds.

Speaking of VRDOs, a dealer once noted: "The way we view it out on the trading desk and the way a lot of investors view it is that if you're a double-A or a triple-A credit, you don't need any credit enhancement because Moody's and S&P are saying that they are confident you can pay off your debt. But, if you're an A-1 credit, or an A-, or a Baa, an investor is going to say, 'This is getting a little risky, I need someone to step in here and provide a credit backstop—I need a credit enhancement before I'll buy.'"

In the past, the credit enhancement of choice was an LOC, but as noted above bond insurance is now the top choice. One problem with LOCs was that the market could get glutted because investors had a cap on their exposure to LOCs. An investor doesn't want 50% of his investments in muni paper to carry LOCs. Today, the U.S. banking industry is strong, but what if something caused banks to be downgraded? The risk of such, however remote, limits investments in muni paper backed by LOCs.

Credit Spreads

Poorer muni credits pay more than better muni credits, but it's difficult to generalize about credit spreads because the market for short-term muni paper is so technical; also, credit spreads rise and fall with the general level of interest rates.

"Quality spreads change," noted one muni-note trader, "throughout the year depending on technicals in the market—supply and demand—the level of rates, and investors' perception of a borrower. Right now, very few borrowers are viewed negatively, with most rated Aa or higher by Moody's, but events can sometimes change the outlook. This was the case at the end of 2005 when the effects of Hurricanes Katrina and Rita put a number of issuers in Louisiana and Mississippi on rating agency watch lists. Consequently, their old MIG notes trade a little worse than other MIG 1 paper.

Municipal Bond Insurance

To increase the marketability of their bonds, some municipal issuers have payment on new bond issues insured for a fee by one of several consortia of insurance companies: FGIC, MBIA, AMBAC, and FSA, which are the largest members of the group, and a few smaller insurers including XL, CFGI, and AGC. These insurers are considered “monoline” insurers because their sole business is insuring municipal bonds. If the insurers were involved in other businesses, it might expose the securities they insure to added risks.

From the issuers’ point of view, bond insurance is worth the premium charged if the insurance reduces the coupon interest they must pay by an even larger amount. Many issuers apparently find the premium worth the price given that close to half of all new municipal issues are insured.

Some muni issuers needing a credit enhancement will insure their bonds but use an LOC for their notes. Notes are shorter in maturity, and LOCs tend to have initial terms of three to five years.

Both the principal and interest paid on municipal bonds insured by triple-A-rated municipal insurers are unconditionally and irrevocably guaranteed against any interruption, even in the event of odd factors such as natural disasters. A municipal bond can be insured in the primary or secondary market.

INVESTORS

The distribution of outstanding municipal securities among investor groups differs sharply from that of federal securities and federal agency securities. Since the single most important advantage of municipals to the investor is the federal tax exemption, the groups holding these securities are those to whom this exemption is worth most.

Corporations

Corporations were once an important part of the tax-exempt market, but at the end of 2005 they accounted for just 2% of direct holdings in municipal securities. The change in the federal tax rate on corporate profits to 34%, combined with some other 1986 changes in the tax code, once made corporations big players in the muni-note market. For the first time in a while, the corporate tax rate was higher than the highest marginal rate for individuals, which at the margin caused some flow of municipal securities between corporations and individuals.

How attractive municipals are to nonfinancial corporations depends partly on the amount and type of borrowing they do. The Internal Revenue Code prohibits the expensing of interest on funds borrowed for the purchase or carry of tax-exempt securities. The precise meaning of this prohibition is a gray area because the IRS has issued few definitive rulings.

Borrowing money to directly fund holdings of municipal securities and expensing the interest paid on the borrowing is seen as a prohibited arbitrage. Some corporations take the position, however, that if they have borrowed money long term to, say, fund construction and don't spend all the money right away, expensing the interest on the bond issue and simultaneously investing surplus funds in tax-exempts is OK.

Also, some corporations with debt outstanding will invest in muni-notes funds earmarked for a specific purpose such as funding dividends. The view here is that holding munis is permissible because the investment bridges a gap between an inflow of funds and a specific outflow that must be met. Despite these practices, some hard-nosed corporate lawyers advise a firm against buying munis if it has any debt outstanding. Indeed, in a study, researchers found that among the very few firms that engaged in this type of arbitrage, many do less than the safe-harbor amount allowed by tax authorities.⁷ To explain these facts, the researchers conclude that "there must be costs of arbitrage that are marginal in the sense that they rise with the size of the position, not just fixed costs as typically assumed."

To illustrate how a nonfinancial corporation might take advantage of the arbitrage opportunities in municipal bonds, consider this hypothetical arbitrage: with AAA municipal bonds yielding 4.72% and AAA corporate bonds yielding 5.43%, a corporation taxed at 35% would have an arbitrage opportunity of 1.19% [i.e., $4.72\% - (5.43\% \times 0.65)$] per dollar of arbitrage. This seems too good to be true, and most companies treat it that way. Although tax laws explicitly prohibit tax deductions for interest on debt used to finance holdings in securities that earn tax-exempt income, the interest disallowance rules contained in Section 265 of the tax code are more complicated than their literal interpretation.

There is one IRS guideline (Rev. Proc. 72-18) that states that a corporation's holdings of municipal securities should not exceed 2% of its total assets. Corporate investors are careful to comply with this ruling. This rule also applies to individuals, but not to dealers.

⁷ Merle Erickson, Austan Goolsbee, and Edward Maydew, "How Present Is Tax Arbitrage; Evidence from the Market for Municipal Bonds," *National Tax Journal*, LVI (1, part 2), March 2003, pp. 259-270.

Money Funds and Other Investors

Banks used to be big investors in municipal notes, but since their ability to deduct interest expenses against tax-exempt income was taken away in 1986, their investments in munis have fallen relative to other investments. Banks, however, more freely take advantage of the arbitrage opportunities that corporations tend to avoid. Muni notes look more attractive to a bank when carry is positive or state tax law provides an incentive for banks to hold locally issued munis. Commercial banks held \$158 billion of municipal securities at the end of 2005; savings banks held \$8.6 billion.

As banks faded out of the muni-note market, tax-exempt money funds became ever more important buyers of such paper and of VRDOs as well. At the beginning of 1989, tax-exempt money funds held over \$65 billion of short-term muni paper. At the end of 2005, they held \$337 billion. In addition, mutual funds held another \$313 billion. A number of tax-exempt muni funds are single-state funds: they hold solely securities issued in New York State and in California, for example; these are high-tax states, so for investors living in them, the double tax exemption that single-state money funds offer has great value.

In several respects, the muni-note market differs significantly from other sectors of the money market. First, it is more of an investors' market; that is, people who buy notes generally have a bona fide need for tax-free income, and they need it to the maturity date. Moreover, on the maturity date they will probably roll their old notes into new "tax frees." That is not to say that investors who expect interest rates to rise won't sell muni notes, but generally, they don't play the yield curve game or otherwise trade these securities. In the muni-note business, most sales are to investors who hold to maturity. A second distinctive feature of the muni-note market is that individuals are a *huge* factor in this market, especially when rates are attractive. At the end of 2005, individuals held \$845 billion of municipal securities, roughly 40% of all municipals outstanding. That's in addition to the municipals they held indirectly via mutual funds. The IRS estimates that over 5 million households currently hold municipals in some form.

Institutional investors and tax-exempt money funds, some of which are limited by their prospectuses to buy MIG 1, SP-1 paper, will almost without exception buy only high-quality muni notes. The principal buyers of lower-rated paper are individuals—doctors, lawyers, corporate managers, and other wealthy folk—to whom such paper is peddled in small blocks by major Wall Street firms and wire houses—some 3,000 are registered

with the MSRB to buy and sell municipal bonds. There are probably only a handful of institutional buyers who will buy MIG 2 notes. The remainder is sold to individuals. That is the difference between the MIG 1 market and the rest of the market.

On the one hand, the sharp lowering, following the 1986 tax act, of the highest marginal tax rates imposed on the incomes of individuals cut the incentive for individuals to hold municipal securities. On the other hand, however, the 1986 tax law changes worked to enhance the attractiveness of munis to individuals because these changes made holding tax-exempt securities one of the few tax shelters left to individuals.

Yield

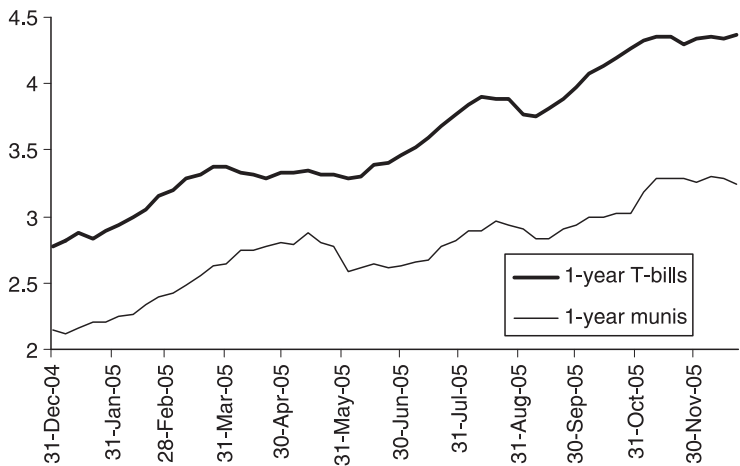
The yield on a particular muni-note issue depends on the credit of the issuer, the maturity of the issue, the general level of interest rates, and the value of the tax exemption to investors.

Given that the tax rate on corporate profits is 35% (for taxable income over \$18,333,000) and that the top marginal rate on individuals is also 35%, it seems reasonable to assume that the average tax rate paid by buyers of muni notes is 35% or somewhat less. This suggests that, credit risk aside, 1-year munis carrying a MIG 1 rating ought to trade at a yield equal to 0.65 times the yield on 1-year Treasuries (measured on a money market basis). Actually, MIG 1, 1-year muni notes have traded at a yield that tracks the yield on the 1-year (Figure 25.3). However, during 2005 the yield of 1-year muni notes having a MIG 1 rating exceeded by roughly 40 bp the yield one gets by multiplying the comparable yield on the year bill (the constant maturity bill tracked by the Federal Reserve) by 0.65. Presumably, the 40 bp reflect partly a difference in the credit risk that investors attach to the two instruments; also, it may reflect the drawing into the note market of many investors whose marginal tax rate is less than 35%.

The ratio of municipal to Treasury yields is a key proxy of the value of municipals to investors. Data from the Bond Market Association show that through the first nine months of 2005, the ratio was 90%, an increase from the same period a year earlier when it was 85.2% and near the upper end of the range seen during the period 1998–2005 (Figure 25.4). By the middle of 2006, the ratio had fallen to about 80%, a reflection of rising Treasury yields.

FIGURE 25.3

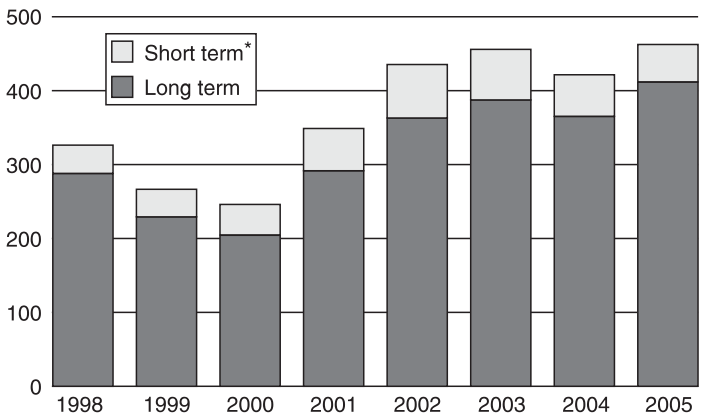
Municipal notes trade at a spread below Treasuries



Sources: The Bond Buyer, Federal Reserve, Bloomberg

FIGURE 25.4

Short- and long-term municipal issuance, 1998–2005
(in billions of dollars)



*Includes maturities of 13 months or less.

Sources: Bond Market Association, Thomson Financial Securities Data

YEARLY ISSUANCE AND AMOUNT OUTSTANDING

As Figure 25.4 shows, the muni-note market has seen issuance of about \$400 billion in recent years, with about 90% of the total in maturities of 13 months or longer. Approximately a quarter of the proceeds have gone to education-related and general government expenses, followed by transportation, health care, housing, and utilities. Daily trading volume has steadily increased (Figure 25.4), but at about \$25 billion in the second quarter of 2006, trading volume in municipals is quite low compared to other segments of the bond market. Most of the volume in municipal securities occurs in securities issued no more than six months earlier. Data from the MSRB's Web site show that during the period May 1998 to April 1999, 41.2% of trading volume was in securities that were trading within six months of their sale date. From there the numbers begin to fall considerably; the total amount of municipal securities traded within 6 to 12 months of their sale date represented only 6.5% of total volume. A staggering 69% of all of the 1.5 million municipal securities outstanding at that time did not trade at all during the period. These data show that once a security is sold to the public, it gets tucked away and rarely trades again after six months from its initial sale date.

THE NEW-ISSUE MARKET

State and local governments and the authorities they create run into short-term needs for cash that are totally separate from their long-term capital needs; when they do, they borrow just like any other spending unit. Because state and municipal borrowers differ sharply in size and character, the ways in which they issue notes vary widely, a situation having no parallel elsewhere in the money market.

At one extreme is the situation in which a town needs \$50,000 to pay for a fire engine and tax receipts are not coming in until later. The town goes to its local bank and signs a \$50,000 note, which the bank calls a TAN and sticks in its portfolio. Deals of this sort, which represent a big percentage of all muni-note deals (as opposed to issuance), are not made on a competitive basis. The rate on the note is not a market rate but often something related to prime.

At the other extreme is a situation in which the amount of money to be borrowed is huge, and the loan may not be in the strict sense a *bridge financing*—one that tides the borrower over until some identifiable receipt

comes in. Sometimes, state or local governments are doing just what the federal government does: they have gotten themselves operating on a perpetual cash-deficit basis, and they are always in arrears because they spend future taxes before they collect them.

Disclosure

Issuers of municipal bonds obtain their authority to issue such securities from their state constitution or statutes. In some cases, this authority is limited, and a favorable vote by the electorate may be necessary before bonds can be issued.

The legality of every municipal bond issue must be approved by an attorney. Such opinions are obtained from bond attorneys who specialize in municipal law. The legal opinion on a bond issue is either printed on the back of the bond or attached to the bond.

Municipal securities are specifically exempt from the registration requirements of the 1933 Federal Securities Act. The only exception is industrial development issues that do not qualify for tax exemption. However, all issuers of new municipal bonds—to make their issue salable—must prepare a detailed prospectus describing the issue and giving comprehensive data on which investors may judge the issuers' credit.

In the muni-note market, as opposed to the muni-bond market, disclosure on publicly issued securities used to be rather casual. The issuer would put together a one-page statement of condition, a balance sheet, and a flowchart (the municipal equivalent of a cash flow or income statement). This would be certified and possibly, but not necessarily, audited. And that was it. Pressure eventually rose following high-profile problems of the 1970s and 1980s.

In the wake of New York City's difficulties in the 1970s, pressure arose for change. Politicians in Washington thought investors in municipal securities deserved more information on the issuers' condition. Also, dealers became concerned over their liability if disclosure on securities they underwrote proved inadequate, so they refused to bid on note issues on which disclosure was incomplete. As a result, issuers of muni notes began to provide detailed information on their condition, often by updating their latest bond prospectus.

Before dealers bid on a muni-note issue or negotiate its sale, they often do their own research on the quality of the issue. They look at the community selling the notes: its tax collections and tax base, who lives there,

and the profitability of local industry. Research of this sort protects the dealer. It also gives him a selling point when he approaches retail. Finally, it may permit a dealer to expand his business by finding borrowers with good credit who through no fault of their own find access to the public market difficult.

An interesting question with respect to disclosure is why, as New York City slipped deeper and deeper into trouble during the 1970s, Moody's did not react faster in downgrading the city's securities and why the banks that were underwriting the city's issues did not sense trouble sooner. The view of one person close to the scene at that time is that when the rating services and the bankers looked at the city's statement of condition, they simply couldn't believe that things were as bad as the numbers indicated. In their gut, they thought there must be a mistake somewhere, that the city must have revenues or something it wasn't disclosing. No one could believe that city officials thought that ever-increasing borrowing was a way to balance the city's budget. Unfortunately, the numbers were not lying; the unthinkable was true, and New York City was on the verge of bankruptcy.

The Dealers

Of the over \$400 billion of municipal securities that were issued in 2005, Citigroup was the leading underwriter, underwriting \$62.6 billion in total proceeds from 894 issues. Second was UBS (UBS ranked first the previous year) at \$45.8 billion from 820 issues. Ranking third was Merrill at \$31.1 billion on 400 issues, and in fourth was Lehman at \$26 billion on 270 issues. Rounding out the top 10 in ranking order were JPMorgan, Bear Stearns, Morgan Stanley, Bank of America, Goldman, and RBC Capital Markets. Combined, the top 10 underwrote 71.6% of total issuance.⁸

Market Technicals

The muni-note market is a technical market resulting from seasonal peaks in both demand and supply. With respect to the supply, a lot of states work on a fiscal year that ends on June 30; they are issuing notes basically against budgeted, working-capital needs and budgeted revenues and tax receipts. In many cases, a state can't issue notes until it gets its budget fixed, which states are often slow to do. Consequently, billions of dollars of California notes

⁸ Thomson Financial, U.S. *Municipals Review* for the fourth quarter of 2005.

(it has been doing a lot of borrowing these days), which are going to mature on June 30 the following year, may come to market in a lump early in August.

During certain periods of the year, one can predict that rates probably will trend upward relative to Treasuries because of withdrawals of funds from the market. April 15 and the three following weeks are one such period. Then there are various corporate tax dates that usually cause a small blip in rates. Issuance tends to be strong during the second quarter, and for certain types of muni financings, December 31 has always been a cutoff date, so there tends to be some new issuance associated with that, but trading volume tends to thin during the holiday season.

Competitively Bid Deals

Much more than half of all publicly offered muni-note issues used to be sold to dealers through competitive bidding as opposed to negotiated deals. Today, the reverse is true. During the first eight months of 2005, negotiated sales accounted for 81% of total issuance, up from 72% 10 years earlier and less than 50% during the earlier part of the 1980s.

In the muni-note market, the overriding philosophy is that of investment banking—developing a constituency that follows the securities being bid on and getting these securities sold. Thus, a muni-note dealer, in bidding on and positioning securities, is more interested in what the muni-note market is likely to do than in market rates in general. He wants, for example, to know how many highly taxable investors are currently in the market.

Large issuers of muni notes who want bids will advertise coming issues in *The Daily Bond Buyer* or elsewhere to get as many bids as possible. Smaller issuers, in contrast, may send notices of sale to only just a few friends. Noted one dealer, “You have to hustle to find out what’s there. It’s not like a bill auction where the whole world is invited.”

Today, big muni-note deals, especially those with a complicated structure, are typically done on a negotiated basis, while it is the smaller deals that are competitively bid. New credits are also likely to be done on a negotiated basis, and when the securities mature, treasurers will often decide to switch to a competitive deal. If a dealer is doing a competitive bid, he’ll take orders against it, but he can’t sell the issue short because he doesn’t know if his bid will win. Instead, he goes to his retail and says, “I think to buy this deal, I’m going to have to bid a 4.80 or just behind it. I will take an order from you at a 4.80 and bid against that order.” If the dealer’s retail says, “OK, I’ll give you an order for \$50 million at a 4.80,” the dealer will

take that order and bid a 4.81 against it—his fulfilling the order is contingent on his buying some or all of the deal. “Most likely,” noted one trader of muni notes, “the customer who gives me an order, if he really wants the notes, is also giving the order ‘away’ [to other dealers].”

In a competitive bid situation, various outcomes are possible. “Maybe,” noted the same dealer, “my bid at a 4.81 loses, and I didn’t buy it. UBS bid a 40; he buys the whole thing; and now he reoffers at a 4.75. No other dealer is going to short the issue to sell to retail. UBS controls it until he sells some. Alternatively, it might be that UBS bought \$25 million at a 4.80, I bought \$25 million at a 4.81, Merrill bought \$50 million at a 4.78, and Citi bought the rest at a 4.87. Now, we all own them at different levels. I can decide that I want to sell mine, thinking that Merrill or UBS might give me a bid just to support their positions or that Citi might want to own more. Or someone else might say, ‘Hum, the market does not feel good; the notes are in a bunch of different hands. I am going to short them—put them up for the bid. They won’t know who’s selling, and maybe I can buy back any notes I sell later at a cheaper price.’”

Negotiated Deals

On a big negotiated deal, maybe several billion of a deal in California, there will be a senior manager, say it’s Citigroup, and a number of comanagers. Citigroup and each of the comanagers might have a *liability* of \$200 million, which means that if the deal is poorly received, each is responsible for taking down \$200 million at the negotiated price.

Also, each comanager typically gets some *retention*, which means that no matter how well sales by Citigroup go, each comanager can count on getting at least \$30 million of notes to sell to its customers. Assuming that the deal isn’t a complete bomb and that it does well, orders coming into Citigroup will probably be over \$2 billion; those orders—maybe for \$50 million or \$100 million each—might be from other dealers, from funds, from corporations, from insurance companies, or from other retail.

On a negotiated deal, the issuer pays a management fee which the managers split on a pro rata basis, according to their individual liabilities. Also, if there’s retention, a comanager is assured of getting a certain number of notes. And, if the deal is priced properly—it’s going to do well—he’ll want those notes to offer because a negotiated deal is always priced with a spread.

Also, there’s a concession in takedown, just as there is in bonds. For example, suppose a New York State deal is priced (as one once was)

at *7% less a dollar plus a dollar*. This means that the managers get to take down any retention due them at a price of \$1,000 minus \$2; this works out to a dollar price of \$99.80, which, on 1-year paper carrying a 7% coupon, is equivalent to a 7.21 yield.⁹ If a customer comes into Citigroup presale, say a money fund, and says, “I want \$50 million,” he gets his paper at 7% less a dollar, which works out to a dollar price of \$99.90 and a yield of 7.10. The extra 10 bp offered presale is an enticement to the fund and to other customers to come in and buy notes early.

In our example, Merrill Fund gets a concession that’s half the total takedown of \$2. The Merrill Fund manager might assign \$10 million of his purchase to one of the comanagers, say, J.P. Morgan Securities, in which case Morgan would get \$10,000 on the presale. If, alternatively, the fund manager waits to buy his \$50 million until after the presale period when comanagers have gotten their retention, he will—assuming the deal is going well—have to pay a dollar price of \$100, which means that he’ll get a return of 7 flat, and the selling dealer or dealers will get the total take-down of \$2 per \$1,000, or \$50,000 on the fund’s purchase of \$50 million notes. Or maybe the issue will take off, and dealers who get retention will be able to sell at yield below 7.

In a syndicated deal, of the sort we’ve described, the issuer pays the “less a dollar, plus a dollar” spread plus management fees; so the total spread might be as much as \$2.50. That depends on various factors, including the size of the issue.

Big deals are negotiated, and the dealers syndicate the liability. The alternative of competitive bidding is viewed as unattractive because, on a big issue, the bidding can get sloppy—have a big tail, for example. However, when large issuers have come with big deals for competitive bids, the dealers, in bidding, have joined to form syndicates; and the bids received by these issuers seemed decent. Still, issues over \$500 million are generally negotiated.

Because of market technicals, it’s hard to generalize about the relationship between the size an issuer comes with and the rate he gets. Since the fiscal years of most municipalities end on June 30, a ton of notes mature then; after that there’s typically little new issuance until mid-July. The huge amount of supply that comes from mid-July through

⁹ The calculation: at the end of one year, the note buyer gets, for investing \$99.80 today, \$100 of principal *plus* \$7 of interest. So, on a simple interest basis, his annual return is given by the expression:

$$1 - \$107/\$99.80 = 0.0721 = 7.21\%$$

early August hurts the issuer who has a lot to do in that period: his notes have to compete with those of many other issuers. Also, if an issuer comes with big size, he may get an attractive rate because individuals come in to buy in a big way.

WI Trading

New note issues are typically sold *settlement from dated date*, which means that they settle on the day they are dated and thus start to accrue interest. However, the dated date and the settlement date don't always coincide. Sometimes notes settle later than the date that they're dated. During the period between sale and settlement, notes trade *WI*—in some cases, for weeks.

The WI period is an attractive time for a dealer to trade notes because he can do so without putting up any money and thus has no carry cost. One disadvantage of delayed settlement to an issuer is that a lot of money funds won't buy such paper because they don't know what their cash flows will be on settlement day.

THE SECONDARY MARKET

We showed earlier how a very large percentage of municipal securities rarely trade after they have been issued. Muni investors buy notes and put them away, making secondary-market trading in them a pale affair compared to that in, say, bills. Basically, the muni-note market is a placement market, not a trading market.

The Brokers

There are a large number of muni brokers. Activity varies a lot day to day, with January, December, April, and June tending to be big months.

"Every morning," noted one trader, "I come in, immediately call each of the brokers, and ask, 'Do you have any opening markets today?' Or I might give the broker a market. I might ask, 'Do you have a market on NYS TRAns today? What are your markets on States, California, Cities, Texas?' I'd also ask him about any miscellaneous names I might be following. A lot of times, the most liquid names have a two-way market: for NYSs there is always a bid and an offer. There might be only one bid out there and four offerings; the broker might say, 'I've got a 5.75 bid,

good for \$5 million. It's in one spot. Behind that, my next best bid is an 80. I have four people offering at a 74; and behind that, I have 70 offerings.' Then I might say, 'What's the market on LA counties?' He might reply, 'Well, on the Street, there is only \$20 million, one guy's holding them [the float on this particular security is only \$20 million], he's offering them at 5.80. I think if he saw a bid close to that he might be inclined to hit it.' So right there, I know that because one guy is holding all of the LA counties in the Street, there isn't going to be another offering—it'd be very risky to short it. Whereas with NYSSs, there is a total issue size of a few billion, and they are always coming in and out of the market. So there might be someone willing to offer them who doesn't own them. Also, there's typically a bid out there—people have an interest at certain levels."

Trading in the Secondary Market

Every dealer in muni notes will make a market to customers in anything they have sold him, and dealers do some secondary trading to satisfy customer needs. Investors, however, work their muni-note portfolios less hard than their taxable portfolios; they buy tax-exempts for yield, taxables for trading. One deterrent to trading muni notes is taxes. An investor who, when rates decline, sells munis at a gain and replaces them with a lower coupon trades a future stream of tax-exempt income for a current taxable gain; this amounts to giving away money to the IRS. Muni dealers generate some secondary-market trading when they distribute new issues; they track their customers' holdings and might, to get a new 9-month state note sold, encourage customers to swap out of an old 8-month note for some yield pickup.

The inside or interdealer market in muni notes is active when dealers are long securities. The job of a muni-note dealer is distribution, and he is successful to the extent that he pushes out to retail one issue after another. It is when such distribution fails on one or several issues and a lot of securities are backed up on the Street that trading among dealers really comes alive, with every dealer trying to get back his bid.

Muni-note dealers deal with one another more on a "can do" basis. A dealer will call another to ask for a bid on a particular issue, and the other dealer will tell him what side of the market he's on. In muni notes, dealers are not, as in governments, secretive about their positions. Usually, they advertise them in the hope that other dealers will work on them.

In the interdealer market, quotes are always good for sizes smaller than the average trade size. Spreads are narrow and may approach those in the bill market when blocks of high-quality paper trade.

A dealer in muni notes *cannot* short an outstanding issue because in doing so he would be creating new tax-free interest, something that only states and municipalities may do. A dealer can short municipal issues while they are trading on a “when, as, and if issued” basis, but that’s risky. The issues are so distinctive and discrete that the substitution and swapping capabilities that are present in corporates and governments do not exist. If the dealer can’t find the actual securities to cover his short, he faces a huge legal problem.

Price Volatility

Interest income on municipal securities is tax-exempt, but capital gains and losses on such securities are treated for tax purposes in the same way as on taxable securities. Because of this asymmetry in tax treatment, when interest rates move, municipals are more volatile in price than are taxables.

To see why, suppose that TANs with a 6-month maturity are issued at a 2.65 and 6-month bills at 4. Later, interest rates rise, and the bills issued at 4 fall sufficiently in price to yield 4.5. The TANs issued at 2.65 also fall in price, and as they do, investors in them acquire short-term taxable capital gains. Assuming that investors’ average marginal tax rate is 35%, this means that the TANs must rise one and a half times as fast in yield as (fall faster in price than) the bills to continue to offer investors an equivalent taxable yield. Should interest rates now reverse trend and start to fall, the muni notes would rise in price faster than the taxable bills, again for tax reasons.

REVIEW IN BRIEF

- The term *municipal securities* is used in blanket fashion by the Street to denote all debt securities issued by state and local governments and their agencies. In the middle of 2006, there were \$2.3 trillion of municipal securities outstanding.
- Municipal securities fall into two broad categories: *general obligation securities* and *revenue securities*.
- Municipal issuers sell to investors *two* quite distinct types of short-term paper. The first type is traditional, short-term,

fixed-rate *notes*, such as *tax anticipation notes (TANs)* and *bond anticipation notes (BANs)*. The second type is what's called variable-rate demand bonds.

- Since 1997, all dealer-to-dealer and dealer-to-customer municipal securities transactions have been required by the Municipal Securities Rulemaking Board (MSRB) to be reported to the MSRB after the close of business each day.
- The transactions are reported via the MSRB's Real-Time Transaction Reporting System (RTRS).
- The minimum denomination in which municipal notes are generally issued is \$5,000, although some issuers may impose a higher minimum denomination, usually \$100,000.
- A *variable-rate demand obligation (VRDO)* is a long-term security with periodic rate-reset dates on which the investor may put the paper back to the issuer's trustee at any time with specified notice.
- Most VRDOs are long in term, 20, 30, or even 40 years, but they are considered short-term securities because their yields reset often and because of their put feature.
- Typically, a VRDO is backed with a credit line.
- VRDO paper has a big appeal to investors who want short-term, tax-exempt paper, the demand for which far exceeds the amount of fixed-rate, short-term notes that muni bodies sell. Tax-exempt money funds are major buyers of VRDO paper, owning close to 70% of all VRDO paper.
- To compare yield on a municipal security with that on a taxable security, an investor must compute the *equivalent taxable yield* on the municipal security.
- In the first nine months of 2005, 65.7% of new issuers used some form of credit enhancement, the vast majority of which (89.8%) was in the form of bond insurance.
- The muni-note market is a technical market due to seasonal peaks in both demand and supply.
- During the first eight months of 2005, negotiated sales of municipal securities accounted for 81% of total issuance, up from 72% ten years earlier and less than 50% during the earlier part of the 1980s.

APPENDIX TO CHAPTER 25

Calculating the *taxable* yield that's equivalent to a tax-exempt yield is trivial; still, it seems to create problems for some people. Speaking of this calculation, one fund manager quipped: "The standard answer for most people seems to be to take out their calculators and divide the [tax-exempt] yield by 1 minus the square root of their telephone number." Actually, nothing that difficult is required.

Let

r_{te} = the tax-exempt rate paid as a decimal

r_t = the equivalent taxable rate as a decimal

T = the taxpayer's federal marginal rate as a decimal

Then, for the ratio of the yield on a taxable security to the *equivalent* to the yield on a tax-exempt security, the following relationship must hold:

$$(1 - T)r_t = r_{te}$$

Money Market Funds

A mutual fund is a device through which investors pool funds to invest in a diversified portfolio of securities. The investor who puts money into a mutual fund gets shares in return and becomes in effect a part owner of the fund. Professional management is provided by an outside investment company, which charges the fund a fee equal to a small percentage of the fund's assets. Mutual funds were originally developed to give people an opportunity to invest in a diversified and professionally managed portfolio of stocks or bonds—some funds invest in both. Certain equity mutual funds aggressively seek long-term growth and capital gains, others a high level of current income. Today, mutual funds enable small, less experienced investors to hold diversified portfolios of stocks and bonds at relatively low costs.

In the mid-1970s, when money market rates soared above the lids that regulators imposed on the rates that depository institutions were permitted to pay on time deposits, the stage was set for the birth of a new breed of mutual funds—funds that were able to offer investors high return plus high liquidity by investing in high-yield, short-term debt securities. Mutual funds of this sort, known as *money market mutual funds* (or, more simply, *money funds*), first appeared in 1974; the amount of money invested in these funds has grown rapidly: zero in early 1974, to \$220 billion in 1982, to a peak of \$2.2 trillion in 2001 before falling a bit to \$1.84 trillion in early 2005 in response to low short-term interest rates. By August 2006, the tally was back up to its 2001 peak.

Money funds are one of three major types of *short-term investment pools* (STIPs), which also include short-term investment funds and local government investment pools. For the mutual funds industry as a whole,

mutual funds assets have increased from less than \$1 trillion in 1980 to more than \$7 trillion in 2004, which has helped fuel the growth of money market mutual funds, as many mutual fund holders tend to have money funds in their portfolio. Figure 26.1 illustrates the growth of mutual funds from its infancy in the mid-1980s through 2000.

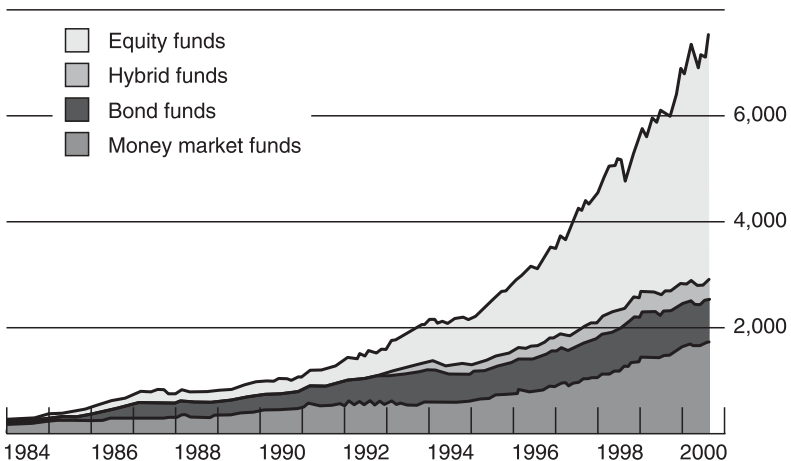
RAISON D'ÊTRE

Money funds were initially designed to meet the needs of the small investor, for whom investing in money market securities is awkward on several counts. Minimum denominations are high. For example, the minimum denomination for most commercial paper issues is \$100,000. Buying securities and rolling them involves more work than some people sometimes care to do or have time for, and having a bank or broker do the job may involve high transaction costs. Also, for some instruments, yields on small denominations are lower than those on large denominations. Finally, an investor with limited funds can't easily reduce risk by diversifying: by buying a mix of different names or instruments.

None of these difficulties exists for mutual funds such as money funds, which pool the resources of many investors. Because such a fund handles large sums of money, high minimum denominations pose no problem.

FIGURE 26.1

Assets of mutual funds, January 1984–August 2000
(in billions of dollars)



Note: Data show month-end assets.

Source: Investment Company Institute, Federal Reserve

Transaction costs in terms of both money and time spent per dollar invested are minuscule compared to the costs that small investors incur. Finally, a money fund is able to buy a wide range of securities, thereby reducing credit risk to a negligible level.

HOW THEY WORK

Forgetting technicalities and legal niceties, a money fund resembles a special bank. This special bank accepts demand deposits only, pays daily interest on these deposits, invests all its deposits in money market instruments, holds few reserves, and keeps only a very small profit margin for itself. For the investor, the only significant differences between banking at such a special institution and putting money in a money fund are that (1) deposits in a money fund are *not* federally insured as are bank deposits, and (2) there are minimum-denomination requirements to meet on initial deposits and on certain types of withdrawals. Despite the fact that deposits in money funds are not federally insured, they are nonetheless fairly safe given that money funds are required by law to invest in high-quality short-term investments issued by the U.S. government, U.S. corporations, and state and local governments. Investor losses have been rare, but they are nonetheless possible. The SEC further reduced the risk of losses when in 1991 it *imposed* new regulations tightening guidelines for the types of securities that the funds could invest in. These investment guidelines can be found in SEC Rule 2a-7.

There have been occasions wherein money funds incurred losses but these losses were not passed on to investors. In 1994, for example, Orange County, California, declared bankruptcy, forcing several tax-free money fund companies to purchase securities from their portfolios to prevent losses to investors. Earlier in 1994, which was a tumultuous year in the fixed-income markets with yields rising sharply, more than 20 money funds were negatively impacted by investments in money market derivatives. Many of these funds needed support from their parent companies in order to spare investors from losses. None of these funds passed their losses on to investors, so no one lost any money on their money market fund holdings.

Investing in a Fund

Money funds do not accept deposits; they sell shares—typically \$1 buys one share. All funds calculate interest daily on outstanding shares and credit

interest to the investor's account periodically, usually at the end of the month. Interest credited to an investor's account is generally used to buy him more shares, if the investor elects such an option, although in some cases investors choose to have the income distributed. Money funds do not issue share certificates. Instead, they send to each investor periodic statements either electronically or via regular mail showing his deposits, his withdrawals, his transfers to other mutual funds that the investor might hold with the same financial institution, and interest credited to his account.

Initially, some money funds were load funds; that is, some of the money invested went to pay a commission to the broker who sold the fund. Today, however, no-load funds are the rule, which makes sense, since money funds are used by many investors much as a checking account—a place to hold temporary liquidity; and deposits and withdrawals are therefore frequent.

Withdrawing Funds

A depositor may withdraw funds from a money fund anytime on demand and without penalty. Typically, withdrawals can be made by the investor with checks sent by the fund to the investor or by wiring funds electronically from his account. Most money funds have set up an arrangement with a commercial bank under which the investor is supplied with checks and can make withdrawals and payments simply by drawing a check against that bank. Generally, the check must be for some minimum amount—\$250, \$500, or \$1,000. When the check is presented to the bank against which it is drawn, that bank covers it by redeeming the required number of shares in the investor's money-fund account.

Where the Money Goes

Since money invested in a money fund is available to the investor on demand, a money fund must be prepared for large and unpredictable withdrawals (redemptions of shares for cash). To do so, all funds hold a portfolio of highly liquid money market instruments. At the start of 2006, the average maturity of securities in the portfolios of Standard & Poor's AA and A-rated money funds was 48 days.

Generally, money funds can meet the cash requirements generated by redemptions through the inflow of funds from new investors plus payments on maturing securities. However, if these sources prove inadequate,

a fund can generate additional cash by selling assets in its portfolio. Since money funds hold large amounts of short-maturity securities, the risk of capital loss on such sales due to adverse movements in market price is small.

Money funds seek to offer the investor not only liquidity and high return, but *safety of principal*. The typical fund is restricted, as noted in its prospectus, from doing any of the following: investing in stocks, convertible securities, and real estate; buying on the margin; effecting short sales; trading in commodities; acting as an underwriter of securities; and placing more than 5% of total assets in the securities of any one issuer.

The first money funds invested only in taxable securities. Then in the 1980s, tax-exempt money funds that invest in tax-exempt municipal paper were created.

The bailiwick of money funds is the money market. As a group, these funds place almost all the monies invested with them in commercial paper, short-term governments and agencies, negotiable CDs, BAs, repos, corporate and foreign bonds, and municipal securities (Table 26.1). There are, however, differences in practice. A few conservative funds stick to governments and agencies. The more aggressive hold a wider range of money market instruments, including Yankee and Euro CDs.

TABLE 26.1

Money-fund assets in the first quarter of 2006*
(in billions of dollars)

Checkable deposits and currency	-4.3
Time and savings deposits	183.5
Security RPs	341.4
Foreign deposits	97.3
Credit market instruments	1,347.7
Treasury securities	84.8
Agency- and GSE-backed securities	153.3
Municipal securities	347.5
Open market paper	489.8
Corporate and foreign bonds	272.4
Miscellaneous	48.4
Total assets	2,014.1

*Does not precisely add due to rounding

Source: Board of Governors of the Federal Reserve, Flow of Funds Statement.

Accounting Procedures

When the money-fund industry was new, different people with different ideas and sometimes different objectives came to the SEC with their proposals for setting up a money market mutual fund; one would say, “We are going to account this way for capital gains and losses,” and another would say, “We are going to account that way.” Since every proposal looked reasonable, the upshot was that the SEC responded with an OK in each case. Thus was born a new class of institutions, with assets destined to rise dramatically in subsequent years. Firms participating in this growth initially used one of four different accounting methods before two methods ultimately prevailed.

Most money funds mark their portfolios to market daily, a sound practice, but one that raises the question of how capital gains and losses, realized and unrealized, should be treated—as net income, as a change in net asset value, or what. Some mark-to-market funds that wanted a steady income stream choose to reflect any realized or unrealized capital gains or losses as changes in the net asset value of their shares. Other funds that wanted to maintain a constant net asset value choose to include realized and unrealized gains and losses in their daily dividends. Still other funds that wanted a constant net asset value, for example, because they sold their fund to bank trust departments, municipal bodies, and other institutions that could assume no risk of capital loss, took the straight-line-accrual approach in accounting. Such funds make it a practice to hold money market instruments in which they invest to maturity; they do not mark their portfolios to market daily; and the interest they credit each day to investors equals the average yield on all securities in the fund’s portfolio.

A fourth approach is to run what’s called a *penny-rounded* fund. Such a fund sets net asset value at \$1 initially. It then marks its portfolio to market and reflects capital gains or losses in the net asset value of its shares. However, these funds round their net asset value to the nearest penny, that is, to the second decimal place; this means that their net asset value could deviate from \$1 only if a huge change occurred in market values. On a yield basis, penny-rounded funds are almost equivalent to the amortized-cost funds.

While each of the four accounting schemes sketched above seems reasonable and can be defended as achieving some desirable objective, the existence of differences in the way money funds report net income can

and does on some days distort by hundreds of basis points comparisons of current yield among different funds.

The two accounting methods for the valuation of money funds that have prevailed are the amortized cost method and the penny-rounding method, mentioned earlier. Both fall under the rules and regulations promulgated under the Investment Company Act of 1940.

With the amortized cost method, portfolio securities are valued at the fund's acquisition cost as adjusted for amortization of premium or accretion of discount rather than at their value based on the current market.

To minimize distortions caused by accounting differences, an investor comparing several funds should look at what is called in the industry a *hypothetical*: If \$1,000 were put in each fund and left there for one month, what rate of return would each fund have yielded the investor? There are companies that track the mutual fund industry that quote the yields paid by different money funds on such a basis.

Hot Money Can Burn

Most money funds mark their portfolios to market daily to reflect any appreciation or depreciation that has occurred in the value of their assets due to fluctuations in interest rates. Some funds reflect such appreciation or depreciation in the value of their assets through minor changes in their share values. Others reflect it by including changes in asset values in the interest return they credit to shareholders' accounts.

A few money funds make it a practice to hold money market instruments they have acquired to maturity. They do not mark their portfolios to market daily, and the interest credited each day to the investors in such funds equals the average yield on all securities in the fund's portfolio. A few individuals on the Street and at the SEC once voiced concern that such straight-line-accrual funds could operate like a Ponzi scheme—Ponzi in honor of Charles Ponzi, a Boston swindler who ran a con game in which early investors were paid off with funds supplied by later investors, leaving nothing for the last investors getting out.

How does Charles Ponzi enter the picture with respect to straight-line-accrual funds? Suppose short-term interest rates were to rise sharply; then the market value of the securities in the fund's portfolio would be temporarily depressed. Suppose also that a large number of investors simultaneously redeemed their fund shares for cash. Conceivably such a fund might be forced to sell off some of its securities at a loss and the

actual *market* value of the securities backing its remaining outstanding shares would fall below its fixed share value. In that case, if redemptions continued, the fund would run out of money before all shares were redeemed.

This eventuality, while theoretically possible, has a small probability of occurring. For it to happen, interest rates would have to rise sharply *and* rapidly, and *all* money invested in the fund would have to be *hot* (very sensitive to interest rates)—an improbable constellation of conditions, particularly in the context of the recent low interest rate environment.

Nevertheless, the SEC, after considering the question for two years, ruled that it would not allow amortized cost valuation for debt instruments with a current maturity of more than 60 days because such valuation does not reflect the “fair value of the underlying portfolio.”

The SEC’s ruling was challenged by a number of funds, in particular, funds serving clients such as bank trust departments and local government bodies that were unwilling or unable to invest funds in an instrument to which even a small market risk attached. In response, the SEC exempted from its ruling funds which agreed to limit their sales to institutions and to require an initial minimum investment of \$50,000. The exempted funds also agreed to limit the average maturity of their portfolios to no more than 120 days, to buy no securities with a current maturity of more than one year, and to severely restrict turnover in their portfolios.

Ironically, the only money fund that ever came close to experiencing difficulties of the sort envisioned by those who feared a Ponzi-type scenario was an institutional fund administered by that most respected of dealers, Salomon Brothers, and advised by First of Chicago.

Most money coming into money funds, especially from small investors, is *hot* (interest-rate sensitive) on the way in but *cold* on the way out; when the rates money funds can pay soar, money pours in, whereas when the rates they can pay fall, money is slow to move out. Investors who put money into a money fund for rate reasons end up keeping their money there, even when money market rates fall, because they like the convenience the funds offer.

In the summer of 1980, Sali’s fund, Institutional Liquid Assets (ILA), extended maturities on the incorrect view that money market rates were going to stay put or decline. Instead, rates rose so sharply that in September the fund’s institutional clients started withdrawing large sums from ILA and putting that money either into other funds that had stayed short and consequently yielded a higher rate than ILA or high-yielding

money market instruments. To fund these withdrawals, ILA had to sell assets. To prevent the sale at depressed prices of its relatively long-term assets from causing a decline in the net asset value of ILA shares, a rescue package was required: First of Chicago returned 1 million of previously paid advisory fees to ILA, and Sali completed the package by buying 228.5 million of governments from ILA at roughly 0.7 million above their market value.

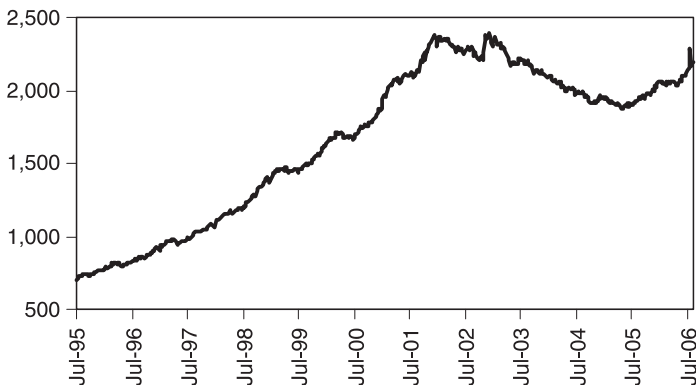
The whole episode, which isn't likely to be repeated, has several ironic touches. First, the fund that had to be rescued had the most impeccable administrator and advisor imaginable. Second, had the fund catered to small investors, it would probably not have been penalized by large withdrawals for mistakenly extending maturities; doctors, lawyers, and Indian chiefs don't make it a daily practice to compare yields on money funds with yields on money market instruments. However, some corporate and other institutional investors do.

GROWTH OF MONEY FUNDS

Ever since money funds first appeared in 1974, they have grown substantially as an investment tool (Figures 26.2 and 26.3). Over the past three decades, the amount invested in money funds has increased progressively, peaking at \$2.24 trillion in 2001 before falling to \$1.86 trillion in 2005. Money funds fell from their peak in 2001 in response to the extraordinarily

FIGURE 26.2

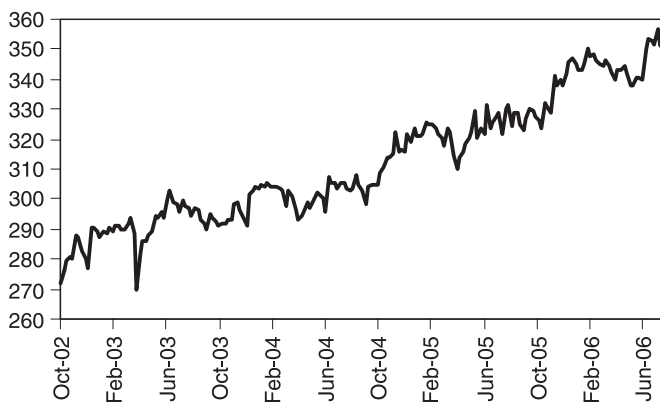
Growth of money fund assets (in billions of dollars)



Source: Investment Company Institute

FIGURE 26.3

Growth of tax-free money fund assets (in billions of dollars)



Source: Investment Company Institute

low level of short-term interest rates, which pushed yields on many market instruments below 1%. At that time, most money funds offered yields of around 0.75%. By August 2006, following a series of interest rate increases by the Federal Reserve, money market fund assets had rebounded to \$2.2 trillion. In the middle of 2005, households held close to 3% of their financial assets in money funds.

Pick Your Flavor

Money funds achieved such rapid growth in part because they created funds in a number of different flavors; the industry became a sort of financial Howard Johnson's: "We've got plain vanilla and 29 other flavors."

At the outset, fund managers created taxable funds, known as *general purpose* money funds, for John Doe, consumer, who couldn't, as a practical matter, invest in money market instruments and earn high money market yields. Later, fund managers created funds having a variety of investment parameters so that an investor could pick a fund that matched his risk preferences. Today, there are funds that invest only in U.S. Treasuries (and repos against them), only in Treasuries and agencies (and repos against them), only in prime domestic money market instruments, only in prime domestic and Euro money market instruments, and only in domestic prime and Euro and Yankee instruments.

There are also funds that invest on a fully hedged basis in prime money market instruments worldwide; this means, for example, that the fund might buy a high-yield, Aussi-dollar, short-term asset and hedge the resulting currency risk by selling Aussi dollars forward. That's called covered *interest arbitrage*, and big corporates have long been doing it. With the globalization of financial markets, covered interest arbitrage is fairly common for both investors and borrowers.¹

The first *tax-exempt* money funds were designed to produce income that was exempt from *federal* income taxes. Then the industry went on to create *state-specific* funds that, by investing in municipal securities issued within a particular state, produce income that, for residents of that state, is exempt from both state and federal income taxes. Some funds give investors a *triple* tax exemption: from federal, state, and city income taxes. This is especially important to investors residing in cities such as New York.

The money-fund industry also created *institutions-only* funds, both taxable and tax-free. Investors in these funds include pension funds, insurance companies, bank trust departments, and corporations. The minimum dollar amount required to invest in these funds is larger than for ordinary money funds sold to the general public. Moreover, these funds tend to have lower management fees, which thus raise the interest rate paid on these funds compared to ordinary funds.

There are also *special-purpose* funds that go after a specific niche market. These funds may cater to individuals within a particular organization or who have a particular affiliation. These funds would be open only to those individuals associated with these organizations or affiliations.

Central-Asset Accounts

Last but not least, there are *central-asset accounts*, also known as stock-broker-affiliated general purpose money funds. Merrill's CMA account was the first and remains one of the largest.

Most brokers offer their clients an in-house money fund or some other money fund in which clients may park investment proceeds, funds temporarily withdrawn from the market, or new funds awaiting investment in stocks and bonds. Merrill came up with the idea that, if a broker were to add some fancy bells and whistles to such an account, it would generate a

¹ We talked about covered interest arbitrage, without calling it that in the commercial paper chapter. Also, we discussed the hedging of foreign-exchange risk in Chapter 18.

lot of large, new accounts. The name Merrill gave to its innovative account, introduced in 1979, was *Cash Management Account (CMA)*; some of the bells and whistles currently offered on this account are:

- a CMA checking account that pays interest at money market rates
- free ATM withdrawals
- unlimited check writing
- Visa debit cards
- Fed wire transfers
- a margin lending program that enables investors to borrow money against their securities holdings

In lending to customers using stocks and other securities as collateral, Merrill is doing something banks could have done for years but didn't in the early going. Banks just never thought of making the procedure of borrowing against such collateral so easy and automatic. In July 1989, Merrill's CMA account ranked as the largest money fund; its \$25.8 billion in assets were twice those of any other fund. In July 2005, Fidelity's Cash Reserve fund was the largest retail money fund, with roughly \$60 billion in assets.

In getting CMA off the ground, Merrill had to figure out how to sidestep the SEC, the Fed, and other regulators; it did this by structuring its CMA account so that it took no improper step on the securities turf where it was authorized to tread and no step at all on the banking turf where it wasn't authorized to tread.

Banks Fight Back

Had it not been for the lids imposed by U.S. regulators on the rates that U.S. banks and other depository institutions (DIs) were permitted to pay depositors, the money-fund business would probably never have taken off. Certainly, it has no foreign parallel because banks in major foreign countries (capitalist ones at least) have always been permitted to pay market rates on deposits. In any case, money funds compete in the United States with banks and other DIs for "deposits."

Since rate deregulation in the early 1980s, banks have been permitted to pay pretty much any rate they choose on consumer deposits. What level and structure of rates they in fact pay depends on the general level of interest rates,

on the shape of the yield curve, on their rate outlook, and on their need for funds. Generally, banks offer higher rates on longer-term CDs, but impose a penalty on a consumer if he withdraws his funds before his CD matures. In addition, banks offer what they call *money market accounts*; these accounts, created in December 1982, pay a rate based on current short-term rates.

Money funds tend to yield a rate that's higher than the rate banks pay on their money market accounts, and the rate differentials can sometimes be substantial. For example, *Barron's* reported on July 25, 2005, that the top yield paid on money funds was 3.34%; that the average 7-day yield on all money funds was 2.72%; and that the average yield on bank money market accounts was only 0.68%. For the conservative consumer, a bank money market fund account offers the advantage, which a money fund does not, of federal deposit insurance. This is one of the key reasons for the difference in rates. Also, one has to presume that many consumers are simply not rate shoppers. Depositing savings with a bank or other DI is a habit they've always had and one they haven't broken.

To compete with wide-service, one-stop-shopping brokers, banks have in recent years offered brokerage service on the terms regulators permit. Many large commercial banks now offer accounts with features similar to those of Merrill's CMA account.

TAX-EXEMPT MONEY FUNDS

There are general-purpose money funds for individuals and money funds for institutions only that invest in a wide range of good-quality money market paper; and there are funds, both for individuals and for institutions only, that restrict their investments to governments or government-guaranteed paper. Like a deli that sells sandwiches, the money-fund industry has funds that meet the needs and tastes of just about every investor.

The one exception, until 1980, was the investor who wanted tax-exempt income. By 1980, rates were so high that the idea of offering a tax-exempt money fund that would limit its investments to short-term, top-quality muni paper became extremely appealing. The hitch, however, was that there was little such paper around.

To rephrase the great economist J. B. Say: *Demand creates its own supply*. So it was with short-term, tax-exempt paper: money funds wanted it; supply was limited; so money funds literally invented the municipal VRDOs (variable-rate demand obligations, also known as "low-floater" bonds) we discussed in Chapter 25. Speaking of the problem money funds

faced in munis, one fund officer once observed, “Traditionally, municipal notes came six months to a year—TRAs, BANs, RANs; there were no municipal demand notes or municipal commercial paper to speak of; and the floating supply of muni notes nearing maturity was very small.” Fund officers recognized that the absence of short-term paper created a void that would limit the size of the tax-exempt money fund industry. In response, funds started using variable-rate demand notes.

Taking their cue from the variable-rate master notes that commercial paper issuers had long offered to bank trust departments, money funds basically said to tax-exempt issuers that they wanted paper with the following characteristics:

1. The rate paid would be 50% of prime.²
2. The rate would be reset at some frequent, short-term interval, for example, daily, weekly, whatever.
3. On each reset date, the paper could be put back by the investor to the issuer’s backstop bank by giving seven days notice to the issuer’s remarketing agent, which is usually the underwriter.
4. The put would be airtight, not *soft*.
5. To guarantee liquidity, the paper would be backed by either a bank Letter of Credit (LOC) or a Stand-by Bond Purchase Agreement (SBPA), and in some cases by establishing a remarketing agent. The LOC provides capital in the event that the VRDO cannot be remarked at the interest rate reset date. The SPA is a stand-by credit facility provided by a commercial bank and insured by a muni-bond insurance company.

The above might sound as if a money fund were asking a lot of an issuer: In particular, couldn’t an issuer get money cheaper by issuing short-term, tax-exempt commercial paper? The response of a money fund was basically that, if an issuer met his terms, gave him a VRDO, that instrument would be so attractive to the fund—would permit the fund to offer, over the rate cycle, a yield so attractive to investors—that the issuer’s VRDO would never, or almost never, be put back to his backstop bank. Thus, the issuer would not be paying up for short-term money, rather he’d be getting long-term money at a short-term rate, which—given

² A money fund backed into the 50% number by saying: What’s a yield that would be attractive to an issuer and that would also allow us, after paying fund expenses and earning a modest profit, to pay a rate that would be attractive to individuals in a high marginal tax bracket?

that the slope of the yield curve is more often positive than negative—would be cheap long-term money.

In creating VRDOs, money funds faced a lot of resistance. First, they had to convince the issuer he was getting a good deal. Second, they had to overcome resistance from the banks: the money funds figured that they could, on average, give muni borrowers money at 50% of prime, whereas the banks had been charging muni borrowers 75% of prime and making good money doing so. Also, broker/dealers did not want to hear about VRDOs because they were trying to get municipal borrowers to do commercial paper programs on which they figured that they'd make more money.

With a VRDO, a dealer, say Goldman, might place it for a small fee, Morgan might be the remarketing agent, a Japanese bank might write the LOC, and yet another bank might give the liquidity line. Usually, the liquidity and the LOC lines are given by the same bank, but not always. Also, the initial placement may be done by a bank dealer as well as by a nonbank dealer. VRDOs are also sold privately.

Initially, 100% of VRDOs were created for money funds. Before 1986, the corporate tax rate was lower than the highest federal marginal tax rates paid by individuals. Only after the 1986 changes in the tax laws did corporations get involved in VRDOs and then only tangentially.

VRDOs are quoted on a yield basis and interest is usually paid either monthly or quarterly. Yields on VRDOs tend to run about 10 basis points or higher, perhaps as much as 25 basis points on an after-tax basis above comparable short-term securities. Rates are set by The Bond Market Association. VRDOs are exempt from federal taxes as well as state taxes, for investors who reside in the state where the VRDOs were issued. There were over \$200 billion of VRDOs outstanding in 2003.

Money Funds Are Holding Larger Share of Municipal Securities

Money market funds held 15.7% of all municipal securities outstanding at the end of 2004, up from 8.5% 10 years earlier, this according to The Bond Market Association. Twenty-five years ago, money funds held only 0.5% of all municipal securities outstanding. The growth in such holdings partly reflects the growth in popularity of municipal money market funds, which are used by investors as an alternative to general-purpose money market funds. For some investors, municipal money funds offer attractive after-tax returns rates compared to other money funds.

MANAGEMENT OF A MONEY FUND PORTFOLIO

A money fund must manage its portfolio under several constraints. First, as noted earlier in the chapter, the SEC puts constraints on the maturities money funds may buy. Second, a money fund must maintain sufficient liquidity to meet daily any demand for cash that its investors might make on it. Third, a money fund must operate in an environment in which both the general level of interest rates and the slope of the yield curve keep shifting over time.

Given these constraints, a lot of money funds end up running portfolios with an average maturity of 40 to 50 days. However, there's a lot of variability fund to fund; also, some funds will stretch maturities when they anticipate a fall in rates.

Portfolio Strategies of Investing in Demand Notes

Buying variable-rate demand notes offers a fund clear advantages with respect to portfolio management. To illustrate, consider two portfolios. One invests only in 90-day paper and ends up earning the average 90-day rate and having a 45-day average maturity (assuming it invests each day the same average amount). The second fund invests half its funds in demand notes that pay a 90-day rate and have a daily put and the other half in 180-day paper; this second fund also has about a 45-day average maturity, but if the yield curve is positive, it earns more than the 90-day rate because it picks up some extra liquidity premium.

Investing in demand notes also gives a fund a more attractive rate profile over the cycle. When rates are rising, the rate earned by a portfolio that's invested half in variable-rate demand notes having a daily reset and half in 180-day paper will lag the market but not as much as the rate on a portfolio invested in 90-day paper with a 45-day average maturity. So in a rising-rate environment, a fund with a lot of demand notes may be able to attract money from other funds. On the other hand, when rates are falling, a fund that holds half its funds in demand notes with a daily put and half in 180-day paper will find its yield falling a little faster than that of other funds. That's OK because, in a falling-rate environment, the manager of a money fund, as opposed to its marketing guy, doesn't want a lot of new money coming in: new money kills a fund's yield when rates are falling.

A final advantage to a fund of investing in demand notes is that it has, as compared to a fund that invests in 90-day paper, roughly half as much

money to invest on a given day; also, it needs on average to deal with roughly half as many names per day to keep its portfolio diversified—to ensure that no one name accounts for more than 5% of its investments. The fewer investments a fund need make each day, the lower it can hold its expenses.

Taxable-Fund Portfolios

The above logic has caused some taxable funds to seek out variable-rate demand notes for their portfolios. For a governments-only fund, repo is a natural variable-rate investment; and a lot of money in such funds is invested not in governments, but in repos collateralized by governments.

Finding other taxable, variable-rate demand notes isn't easy. Some muni bodies that could once issue tax-exempt VRDOs, but which now must issue taxable paper, use the VRDO concept. That concept ought also to be attractive to certain corporate borrowers, in particular to the many firms that are too small to borrow in the commercial paper market on a cost-effective basis and who therefore borrow from their banks. One problem a money fund faces in obtaining such paper is that banks don't want to show the concept to such borrowers because, for a bank, middle-market lending is highly profitable.

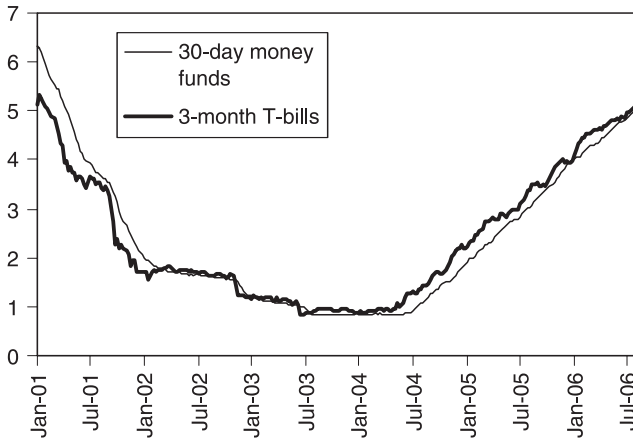
Money-Fund Yields

One would expect yields on money funds, taxable and tax-exempt, to be a spread below and to lag somewhat behind yields on the open market paper in which such funds invest. Figure 26.4, which shows the yields on market funds versus that of 3-month T-bills, illustrates this point.

Savvy investors can take advantage of the lag between yield changes on open market paper and yields on money market funds, particularly when interest rates fall. Many investors apparently recognize the opportunities that arise on such occasions, as there have been sharp swings in the amount of money held in money market funds, particularly institutional money market funds, when the Federal Reserve's interest rate policies have spurred movement in short-term interest rates. In early 2001, for example, when the Fed began to aggressively lower interest rates, inflows into money market funds increased sharply. Investors recognized that yields on money market funds would remain high relative to yields that could be obtained on market instruments such as T-bills and commercial paper, and henceforth shifted money to these instruments.

FIGURE 26.4

Changes in yields on money market funds tend to lag T-bills



Source: Standard and Poor's, Federal Reserve

CONSUMERS' USES OF MONEY FUNDS

For consumers, money funds are a convenient, safe, and liquid investment for tucking away temporary excess funds and a liquidity reserve. These days many consumers are substituting money funds for checking accounts because both have the same functionality but the money fund tends to yield more. Consumers also view money funds as a safe haven for funds they normally would invest in stocks and bonds when they get nervous about the stock and/or bond markets. Such was the case after the bursting of the financial bubble in 2000. Money invested in money funds soared despite a sharp decline in money market rates. Money held in institutional money market funds, for example, increased 50% in 2001 to \$1.218 trillion. By the end of 2004, 21.4% of families held a money market account.³

Absorbing the Management Fee

A money-fund investor, especially one who's investing for the first time in such a fund or in a particular variety of such a fund, is likely to be more

³ Brian K. Bucks, Arthur B. Kennickell, and Kevin B. Moore, "Recent Changes in U.S. Family Finances from the 2001 and 2004 Survey of Consumer Finances," Board of Governors of the Federal Reserve System, *Federal Reserve Bulletin*, February 2006.

yield sensitive than are fund investors in general. For this reason, the highest yields are usually offered by new money funds; sponsors of such funds frequently waive their management fee on a new fund and reimburse it for other operating expenses in order to attract business.

In the past, established money funds would waive their fee to compensate for a bad call in running their portfolios, although in recent years there hasn't been much of a divergence between the performance of portfolios. Still others view the waiving of fees as an attractive service to their equity-fund investors. One manager of a family of mutual funds noted that waiving the management fee on its money fund was a good use of marketing dollars, cheaper than advertising; the notion behind such reasoning is that an investor who decides to move out of a money fund into a stock or bond fund is more likely to make an intrafamily than an interfamily move.

Investors in money funds view such funds as pretty much risk free, and the track record such funds have compiled since 1974 supports this view. This is not to say that no money fund has ever made an investment that went sour. Several money funds were caught holding P-2-rated commercial paper of Integrated Resources when it defaulted in 1989. Other instances were noted earlier. In every case, the fund managers dug into their own pockets to make the fund whole. That's presumably something that every fund manager who could afford the hit would do, since a money fund that lost money would almost certainly suffer massive withdrawals. All of which suggests that a money fund run by an entity with deep pockets, while it may not have federal insurance, certainly has something akin to private insurance. Also, thanks to the fact that funds are—by choice and by SEC requirement—well diversified, that insurance is likely to prove adequate to cover any losses sustained by the fund.

INSTITUTIONAL FUNDS

There are funds around for institutional investors, such as bank trust departments, small banks, other DIs, insurance companies, pension funds, and small corporations.

Bank Trust Departments

In the early 1970s, many banks set up *short-term investment funds* (STIFs) in their trust departments to invest in a cash pool held short-term for

one reason or another in accounts they managed. Such banks often found that they could not afford the software and hardware to do the necessary accounting: to track the earnings on and the money flows into and out of separate accounts. Also, they could not recoup these costs with a fee because they were already charging an overall fee for discretionary management of the funds held in trust.

To get around this problem, many turned to master notes. As noted in Chapter 22, these provide a stable source of funds to note issuers and provide at no cost to lenders—bank trust departments and others—subaccounting that precisely fits their needs. The withdrawal in 1977 of W. T. Grant from its master note program and its later bankruptcy focused attention on the fact that trust account funds invested in a master note—no matter how good the name of the issuer—were exposed to undue credit risk because of the resulting concentration on a single or on several names. Money funds provide trust departments, pension funds, and others running funds for numerous accounts with the convenience of subaccounting *plus* the comfort of knowing that they are satisfying the prudent man rule for diversification of risk. Thus, money funds replaced master notes in many bank trust departments; they are also widely used by other institutions having similar investment needs.

Other Institutional Investors

Although money funds were initially designed to offer individual investors a way to invest indirectly in money market securities, they can also be extremely useful to a corporation or other institution running a small short-term portfolio because the small portfolio manager labors under several disadvantages.

First, since minimum denominations are high in many sectors of the money market, it's difficult for a person managing \$10 million or less to diversify: he has only limited ability to reduce credit risk by holding a mix of names and to reduce market risk by investment in different types and maturities of instruments.

Also, the net yield earned on a small portfolio is reduced far more by transactions costs than is the net yield earned on a large portfolio. If a bank imposes a \$25 fee on an overnight repo, that fee will, on a \$250,000 repo, reduce a gross yield of 8% to 4.35%. Moreover, if the portfolio manager must also pay a fee to wire money out of his bank account or incur any other transaction fee, his net yield will be still lower.

Another problem for the small portfolio manager is that he will inevitably end up buying and selling securities at rates less favorable than those big investors can obtain by buying in round-lot amounts from dealers. This is because big investors tend to be given so-called round-lot prices whereas small portfolio managers are often subject to “odd-lot” prices. Also, a small portfolio can suffer from the lack of professional management: the gains to be had from actively managing a small portfolio—for example, by following the market and making the sort of maturity choices described in Chapter 11—are so small in absolute terms that hiring a skilled portfolio manager isn’t easily cost justified.

Because it’s difficult to manage small short-term balances effectively, it would make sense for many institutions holding money of this sort to invest it in an institutions-only money fund instead of investing it directly in money market instruments. A money fund typically charges a management fee and a fee for expenses. These charges, however, are likely to be largely or fully offset by the fact that the fund, because it’s professionally managing a big pool of short-term funds, can earn a significantly higher *gross* return than can a small portfolio manager.

Whether an institutional investor does or does not use a money fund, the yield it could achieve using one makes a good benchmark against which to compare the yield it achieves over time on its liquidity portfolio, provided, that is, that it adjusts that yield for the *full* investment expenses it incurs.

Capturing Rising Rates with Money Market Funds

It is a simple fact that when interest rates rise bond prices fall. When such seems likely and when there’s much uncertainty about whether interest rates will continue to rise, money market funds can be an attractive instrument if used strategically to simultaneously capture the rate rise and avoid capital losses on longer-dated maturities. With money market funds, there’s not much risk to principal, as the principal invested in money market funds is almost always constant at \$1 per share. This is unlike owning longer-dated maturities where investors would encounter a capital loss. For some investors, shifting to money market funds is not an option, as they must stay fully invested at a relatively fixed maturity. But for those with greater flexibility, if interest rates are steadily rising as a result of interest rate increases from the Federal Reserve, investing in money market funds enables investors to capture the yield rise without incurring much risk

to principal. A caveat: if one bets wrong and short rates stop rising, investors deploying such a strategy will miss opportunities to lock in rates on longer-dated maturities and possibly miss capital gains opportunities.

Using Money Market Funds to Capture Shifts in Market Sentiment

Money market funds can provide useful information about investor sentiment. It was notable, for example, when in 2001 and 2002 money market funds saw extremely high inflows of capital despite sharp declines in money market rates. In 2001 alone, institutional money funds grew by 50% to \$1.2 trillion despite 11 interest rate cuts from the Federal Reserve. The surge reflected an increase in risk-aversion resulting from both the bursting of the financial bubble and 9/11. Such sentiment helped to explain the lackluster performance of the stock market in 2001 and 2002 when the Fed's interest rate cuts failed to lift stock prices as they had in past interest rate cycles. As risk attitudes improved, money flowed out of money market funds and equity prices recovered. Flows into and out of money market funds therefore provide useful information about the degree of risk assigned to riskier assets.

Impact on the Money Supply Data

Flows into and out of money market funds can have a large bearing on the growth of the money supply, as they are included in the Fed's key money stock measures, M2 and M3. Such flows have contributed to the diminution of the money supply as an economic indicator. In other words, there are some who have discredited the money supply data because the growth of money market funds has increasingly impacted the money aggregates, meaning that the aggregates have increasingly captured trends in capital flows instead of economic trends. Nevertheless, monetarists continue to look at the money supply as an important indicator, despite occasional distortions such as those seen in 2001 when the money supply surged due to the surge in money market inflows.

REVIEW IN BRIEF

- In the mid-1970s, when money market rates soared above the lids that regulators imposed on the rates that depository

institutions were permitted to pay on time deposits, the stage was set for the birth of a new breed of mutual funds—money market funds.

- Money market funds offer investors a way to achieve a return that approximates the returns that can be achieved on money market instruments, while also offering high liquidity by investing in short-term debt securities.
- Money market funds enable investors to invest in securities that would otherwise be difficult to invest in because of their large denominations and the frequency at which the securities would have to be rolled over.
- A money fund resembles a special bank that accepts demand deposits only, pays daily interest on these deposits, invests all its deposits in money market instruments, holds few reserves, and keeps only a very small profit margin for itself.
- Despite the fact that deposits in money funds are not federally insured, they are nonetheless fairly safe given that money funds are required by law to invest in high-quality short-term investments. The SEC further reduced the risk of losses when in 1991 it imposed new regulations under SEC *Rule 2a-7* imposing tight guidelines for the types of securities that money funds can invest in.
- Most money market assets are held in commercial paper, followed by municipal securities and repurchase agreements.
- Most money funds mark their portfolios to market daily. Some run a *penny-rounded* fund whereby assets are marked to the market to capital gains or losses in the net asset value of its shares. The rounding to the second decimal makes it likely that most times a penny-rounded fund will be valued at \$1 per share.
- Over the past three decades, the amount invested in money funds has increased progressively, peaking at \$2.24 trillion in 2001. After a decline in 2005, the tally had rebounded to \$2.2 trillion in August 2006.
- Today, many money market funds offer a variety of services including check writing, Visa debit cards, and wire transfers, among other services.

- Money funds literally invented the municipal VRDOs (variable-rate demand obligations, also known as “*low-floater*” bonds) we discussed in Chapter 25.
- Money market funds can provide useful information about investor sentiment by providing insights into the degree of risk investors are assigning to riskier assets.

COMMON MONEY MARKET AND BOND MARKET TERMS

accretion (of a discount): In portfolio accounting, a straight-line accumulation of capital gains on discount bonds in anticipation of receipt of par at maturity.

accrued interest: Interest due from issue or from the last coupon date to the present on an interest-bearing security. The buyer of the security pays the quoted dollar price plus accrued interest.

active: A market in which there is much trading.

actuals: The cash commodity as opposed to the futures contract.

actual/360: The day-count convention applied to the calculation of interest on a fixed-income security. Calculations are based on a 360-day calendar. This day-count convention is applied in the Eurosystem's monetary policy operations.

ACUs (Asian currency units): An expression for Eurodollars deposited in Far East centers.

add-on rate: A specific rate of interest to be paid. Stands in contrast to the rate on a discount security, such as a Treasury bill, that pays no interest.

after-tax real rate of return: Money after-tax rate of return minus the inflation rate.

agencies: Federal agency securities. See also *agency bank*.

agency bank: A form of organization commonly used by foreign banks to enter the U.S. market. An agency bank cannot accept deposits or extend loans in its own name; it acts as an agent for the parent bank. The term is often used on the Street to refer to both foreign bank agencies and branches.

agent: A firm that executes orders for or otherwise acts on behalf of another (the principal) and is subject to its control and authority. The agent may receive a fee or commission.

all-in cost: Total costs, explicit and other. Example: The all-in cost to a bank of CD money is the explicit rate of interest it pays on that deposit *plus* the FDIC premium it must pay on the deposit *plus* the hidden cost it incurs because it must hold some portion of that deposit in a non-interest-bearing reserve account at the Fed.

all or none (AON): Requirement that none of an order be executed unless all of it can be executed at the specified price.

American option: An option that may be exercised at any time during the life of the option. U.S. option exchanges, such as the CBOE, trade mostly American options, although all of the CBOE's interest-rate options have European-style exercise.

amortize: In portfolio accounting, periodic charges made against interest income on premium bonds in anticipation of receipt of the call price at call or of par value at maturity.

arbitrage: Strictly defined, buying something when it is cheap and selling it when it is dear; for example, a bank buys 3-month CD money in the U.S. market and sells 3-month money at a higher rate in the Eurodollar market. In the money market, *arbitrage* often refers: (1) to a situation in which a trader buys one security and sells a similar security with the expectation that the spread in yields between the two instruments will narrow or widen to his profit, (2) to a swap between two similar issues based on an anticipated change in yield spreads, and (3) to situations in which a higher return (or lower cost) can be achieved in the money market for one currency by utilizing another currency and swapping it on a fully hedged basis through the foreign-exchange market.

asked: The price at which securities are offered.

automated clearinghouse (ACH): An electronic clearing system in which payment orders are exchanged among financial institutions, primarily using magnetic media or via telecommunications networks, and handled by a data processing center.

away: A trade, quote, or market that does not originate with the dealer in question, for example, "The bid is 98-10 away (from me)."

back contracts: Futures contracts farthest from expiration; also called *back month* or *far contracts*.

back discount rate: Yield basis on which short-term, non-interest-bearing money market securities are quoted. A rate quoted on a discount basis understands bond equivalent yield which must be calculated when comparing return against coupon securities.

back-to-back loan: A back-to-back loan is one in which two different companies in two different countries borrow in their home country's currency and lend that money to the other company. An example of a back-to-back loan would be IBM agreeing to lend dollars to British Petroleum in exchange for British Petroleum lending pounds to IBM. Such agreements are struck only in rare cases when exchange controls in one or more countries prevent normal capital flows.

back up: (1) When yields rise and prices fall, the market is said to back up. (2) When an investor swaps out of one security into another of shorter current maturity (e.g., out of a 2-year note into an 18-month note), he is said to back up.

bank line: Line of credit granted by a bank to a customer.

bank notes: Unsecured notes issued by a bank in the form of an MTN. No FDIC premium is paid by the issuing bank. Also called a *bank bill*.

bank wire: An electronic system linking major banks. It is used not for effecting payments, but as a mechanism to advise the receiving bank of some action that has occurred, for example, the payment by a customer of funds into that bank's account. One of the most popular of these systems is SWIFT.

bankers' acceptance (BA): A draft or bill of exchange accepted by a bank or trust company. The accepting institution guarantees payment of the bill.

BANs (bond anticipation notes): Notes are issued by states and municipalities to obtain interim financing for projects that will eventually be funded long term through the sale of a bond issue.

basis: (1) Number of days in the coupon period. (2) In *commodities* jargon, *basis* is the spread between a futures price and some other price. A money market participant would talk about *spread* rather than *basis*.

basis point (bp): $\frac{1}{100}$ of 1%. One of the more commonly referenced terms in the bond market.

basis price: Price expressed in terms of yield to maturity or annual rate of return.

basis swap: See *interest-rate swap*.

BBA (British Bankers Association): The BBA is the principal trade association for banks operating in the United Kingdom.

bear market: A declining market or a period of pessimism when declines in the market are anticipated. (A way to remember: “Bear down.”) Sometimes defined as a decline of 20% or more in the equity market.

bearer security: A security the owner of which is not registered on the books of the issuer. A bearer security is payable to the holder. Few securities are issued in this format. No Treasuries have been issued in bearer form since 1986, and by 2006 there were only \$5.2 billion of Treasuries outstanding still in bearer form.

best-efforts basis: Securities dealers do not underwrite a new issue, but sell it on the basis of what can be sold. In the money market, this usually refers to a firm order to buy or sell a given amount of securities or currency at the best price that can be found over a given period of time; it can also refer to a flexible amount (up to a limit) at a given rate.

bid: The price offered for securities.

BIS (Bank for International Settlements): An international organization that endeavors to foster international monetary and financial cooperation, and which serves as a bank for central banks.

blind broker: A broker who acts as principal and does not give up names to either side of a brokered trade. Blind brokering of securities is common, whereas blind brokering of fed funds and Eurodollar time deposits would be infeasible.

block: A large amount of securities, normally much more than what constitutes a round lot in the market in question.

book: A banker, especially a Eurobanker, will refer to his bank’s assets and liabilities as its *book*. If the average maturity of the liabilities is less than that of the assets, the bank is running a short and open book.

book-entry securities: Securities that are not represented by engraved pieces of paper but are maintained in computerized records. Securities that are not book-entry do not move from holder to holder but are usually kept in a central clearinghouse or by another agent.

book value: The value at which a debt security is shown on the holder’s balance sheet. Book value is often acquisition cost plus or minus amortization/accretion, which may differ markedly from market value. It can be further defined as *tax book*, *accreted book*, or *amortized book* value.

bp: Market abbreviation for basis point(s). Thus, 1 bp means 1 basis point, and 10 bp means 10 basis points. Sometimes denoted as *bps*.

bridge financing: Interim financing of one sort or another.

British clearers: The large clearing banks that dominate deposit taking and short-term lending in the domestic sterling market in Great Britain.

broken date: See *cock date*.

broker: A broker brings buyers and sellers together for a commission paid by the initiator of the transaction or by both sides; he does not position. In the money market, brokers are active in markets in which banks buy and sell money and in interdealer markets.

bull market: A period of optimism when increases in market prices are anticipated. (A way to remember: "Bull ahead.")

bullet (loan or security): All principal is due at maturity.

bullet loan: A bank term loan that calls for no amortization. The term is commonly used in the Eurodollar market.

Bunds: German government securities.

buy a spread: Buy a near futures contract and sell a far one.

buyback: Another term for a repurchase agreement. Also used to denote the U.S. Treasury's program for repurchasing Treasury securities, a program that ended in 2001 when Treasury surpluses were turning to deficits.

calendar: List of new bond issues scheduled to come to market soon.

call: An option that gives the holder the right to buy the underlying security at a specified price during a fixed time period.

call money: Interest-bearing bank deposits that can be withdrawn on 24 hours' notice. Many Eurodollar deposits take the form of call money.

callable bond: A bond that the issuer has the right to redeem prior to maturity by paying some specified call price.

cap: A series of options for which the writer guarantees the buyer, a payor of floating, that he will pay the buyer whatever additional interest he must pay on his loan if the rate on that loan goes above an agreed rate, *X*.

carry: The interest cost of financing securities held. See also *negative* and *positive carry*.

cash commodity or security: The actual commodity or security as opposed to futures contracts for it.

cash management bill: Very short maturity bills that the Treasury occasionally sells because its cash balances are down and it needs money for a few days.

cash market: Traditionally, this term has been used to denote the market in which commodities were traded, for immediate delivery, against cash. Since the inception of futures markets for T-bills and other debt securities, a distinction has been made between the cash markets in which these securities trade for immediate delivery and the futures markets in which they trade for future delivery.

cash price: Price quotation in the cash market.

cash settlement: In the money market, a transaction is said to be made for cash settlement if the securities purchased are delivered against payment in fed funds on the same day the trade is made.

CBOE (Chicago Board Options Exchange): The largest options marketplace in the United States.

CBOT (Chicago Board of Trade): A leading futures exchange established in 1848.

certificate of deposit (CD): A time deposit with a specific maturity evidenced by a certificate. Large-denomination CDs are typically negotiable.

CHIPS: The New York Clearing House's computerized clearinghouse interbank payments system. Most Eurodollar transactions are cleared and settled through CHIPS rather than over the Fed's payment system, Fedwire.

circle: Underwriters, actual or potential as the case may be, often seek out and "circle" retail interest in a new issue before final pricing. The customer circled has basically made a commitment to purchase the note or bond *or* to purchase it if it comes at an agreed-upon price. In the latter case, if the price is other than that stipulated, the customer supposedly has first offer at the actual price.

clear: A trade carried out by the seller delivering securities and the buyer delivering funds in proper form. A trade that does not clear is said to fail.

cock date: In the Eurodollar market, an off-the-run period, for example, 28 days. Also referred to as a *broken date*. A cock date contrasts with a fixed date, which is 30, 60, 90, and so on, days.

collar: A cap plus a floor.

commercial paper: An unsecured promissory note with a fixed maturity of no more than 270 days. Commercial paper is normally sold at a discount off face value.

The commercial paper market is one of the largest segments of the money market.

committed facility: A legal commitment undertaken by a bank to lend to a customer.

competitive bid: (1) Bid tendered in a Treasury action for a specific amount of securities at a specific yield or price. Most bids are entered this way. (2) Issuers, municipal and public utilities, often sell new issues by asking for competitive bids from one or more syndicates.

confirmation: A memorandum to the other side of a trade describing all relevant data.

consortium banks: A merchant banking subsidiary set up by several banks that may or may not be of the same nationality. Consortium banks are common in the Eurodollar market and are active in loan syndication.

convertible bond: A bond containing a provision that permits conversion to the issuer's common stock at some fixed exchange ratio.

convexity: The slope of the price-yield relationship for a fixed-income security. Convexity is normally positive, but it can be negative.

corporate bond equivalent: See *equivalent bond yield*.

corporate taxable equivalent: Rate of return required on a par bond to produce the same after-tax yield to maturity that the premium or discount bond quoted would.

country risk: See *sovereign risk*.

coupon: (1) The annual rate of interest on a bond's face value that a bond's issuer promises to pay the bondholder. (2) A certificate attached to a bond evidencing interest due on a payment date.

coupon swap: See *interest-rate swap*.

cover: To eliminate a short position by buying the securities shorted.

cover ratio: The amount of bids submitted in an auction compared to the amount of securities for sale. Also known as the *bid-to-cover ratio*.

covered call write: Selling calls against securities owned by the call seller.

covered interest arbitrage: Investing dollars in an instrument denominated in a foreign currency and hedging the resulting foreign-exchange risk by selling the proceeds of the investment forward for dollars.

credit default swap (CDS): A credit derivative that enables parties to exchange the credit risk of fixed-income securities. CDS buyers purchase protection against a bond's default, paying a fee to protection sellers.

credit enhancement: The backing of paper with collateral, a bank LOC (line of credit), or some other device to achieve a higher rating for the paper.

credit risk: The risk that an issuer of debt securities or a borrower may default on his obligations, or that payment may not be made on sale of a negotiable instrument.

cross-currency swap: An interest-rate swap in which the interest payments due are denominated in different currencies.

cross hedge: Hedging a risk in a cash market security by buying or selling a futures contract for a similar but not identical instrument.

current coupon: A bond selling at or close to par; that is, a bond with a coupon close to the yield currently offered on new bonds of similar maturity and credit risk.

current issue: In Treasury bills and notes, the most recently auctioned issue. Trading is more active in current issues than in off-the-run issues.

current maturity: Current time to maturity on an outstanding note, bond, or other money market instrument; for example, a 5-year note one year after issue has a current maturity of four years.

current yield: Coupon payments on a security as a percentage of the security's market price. In many instances the price should be *gross* of accrued interest, particularly on instruments where no coupon is left to be paid until maturity.

curve trader: A trader who does arbitrages along the yield curve by buying securities at one end of the curve and selling securities at the other end of the curve.

cushion bonds: High-coupon bonds that sell at only a moderate premium because they are callable at a price below that at which a comparable noncallable bond would sell. Cushion bonds offer considerable downside protection in a falling market.

day trading: Intraday trading in securities for profit as opposed to investing for profit. Many traders in futures pits are day traders.

daylight overdraft: Being overdrawn (OD) in a deposit account during some of a day's business hours. Foreign banks typically run big daylight overdrafts with their U.S. correspondent bank. A daylight overdraft exposes the institution that extends it to a credit risk. Daylight credits are given by central banks to cover mismatches in payment settlements.

dealer: A dealer, as opposed to a broker, acts as a principal in all transactions, buying and selling for its own account.

dealer loan: Overnight, collateralized loan made to a dealer financing its position by borrowing from a money market bank.

debenture: A bond secured only by the general credit of the issuer.

debt leverage: The amplification in the return earned on equity funds when an investment is financed partly with borrowed money.

debt securities: IOUs created through loan-type transactions—commercial paper, bank CDs, bills, bonds, and other instruments.

default: Failure to make timely payment of interest or principal on a debt security or failure to otherwise comply with the provisions of a bond indenture.

delivery month: A month in which a futures contract expires and delivery may be taken or made.

delta hedge of an option: A hedge of an option with a position in the underlier where the hedge ratio is based on the option's delta.

delta of an option: The rate of change of the value of an option with respect to the price of the underlier, evaluated at the current market price of the underlier.

demand line of credit: A bank line of credit that enables a customer to borrow on a daily or an on-demand basis.

deposit note: An FDIC-insured, negotiable time deposit issued by a bank, in the form of an MTN.

direct paper: Commercial paper sold directly by the issuer to investors.

direct placement: Selling a new issue not by offering it for sale publicly, but by placing it with one or several institutional investors.

discount basis: See *bank discount rate*.

discount bond: A bond selling below par.

discount house: British institution that uses call and overnight money obtained from banks to invest in and trade money market instruments.

discount paper: See *discount securities*.

discount rate: The rate of interest charged by the Fed to member banks that borrow at the discount window. The discount rate is set above the fed funds rate. The rules governing the discount rate were changed in 2003.

discount securities: Non-interest-bearing money market instruments that are issued at a discount and redeemed at maturity for full face value; for example, U.S. Treasury bills.

discount window: Facility provided by the Fed enabling member banks to borrow reserves against collateral in the form of governments or other acceptable paper. The Federal Reserve Banks offer three discount window programs to depository institutions: primary credit, secondary credit, and seasonal credit, each with its own interest rate.

disintermediation: The investing of funds that would normally have been placed with a bank or other financial intermediary directly into debt securities issued by ultimate borrowers; for example, into bills or bonds.

distributed: After a Treasury auction, there will be many new issues in dealers' hands. As those securities are sold to retail, the issue is said to be *distributed*.

diversification: Dividing investment funds among a variety of securities offering independent returns.

documented discount notes: Commercial paper backed by normal bank lines plus a letter of credit from a bank stating that it will pay off the paper at maturity if the borrower does not. Such paper is also referred to as LOC (letter of credit) paper, a common form of commercial paper issuance.

dollar bonds: Municipal revenue bonds for which quotes are given in dollar prices. Not to be confused with "U.S. dollar" bonds, a common term of reference in the Eurobond market.

dollar price of a bond: Percentage of face value at which a bond is quoted.

don't know (DK, DKed): "Don't know the trade"—a Street expression used whenever one party lacks knowledge of a trade or receives conflicting instructions from the other party (for example, with respect to payments and securities deliveries).

due bill: An instrument evidencing the obligation of a seller to deliver securities sold to the buyer. Occasionally used in the bill market.

duration: A measure of the current maturity of a fixed-income instrument as the weighted average of the time to receipt of the payments thrown off by the instrument; the weights used are the present values of the future payments to be received.

Dutch auction: Auction in which the lowest price necessary to sell the entire offering becomes the price at which all securities offered are sold. This technique is used in Treasury auctions.

Edge Act corporation: A subsidiary of a U.S. bank set up to carry out international banking business. Most such "subs" are located within the United States.

either/or facility: An agreement permitting a bank customer to borrow either domestic dollars from the bank's head office or Eurodollars from one of its foreign branches.

either-way market: In the interbank Eurodollar deposit market, an either-way market is one in which the bid and asked rates are identical.

elbow: The elbow in the yield curve is the maturity area considered to provide the most attractive short-term investment; for example, the maturity range in which to initiate a ride along the yield curve.

eligible bankers' acceptances: In the BA market an acceptance may be referred to as eligible because it is acceptable by Federal Reserve Banks as collateral at the discount window and/or because the accepting bank can sell it without incurring a reserve requirement.

equivalent bond yield: Annual yield on a short-term, non-interest-bearing security calculated so as to be comparable to yields quoted on coupon securities.

equivalent taxable yield: The yield on a taxable security that would leave the investor with the same after-tax return he would earn by holding a tax-exempt municipal; for example, for an investor taxed at a 50% marginal rate, equivalent taxable yield on a muni note issued at 3% would be 6%.

EU (European Union): The EU is a supranational and intergovernmental union of 25 independent, democratic member states and the world's largest confederation of independent states.

EU Council: Also known as the *Council of Ministers*. An EU institution made up of representatives of the governments of the member states, normally the ministers responsible for the matters under consideration.

EU member state: A country that is a member of the European Union.

EUREX: As of 2006, it is the world's largest derivatives exchange and the leading clearinghouse in Europe.

EURIBOR: The rate at which a prime bank is willing to lend funds in euros to another prime bank.

euro: The name of the currency adopted by the European Council for countries participating in the European Monetary Union.

euro area: The area encompassing those EU member states in which the euro has been adopted as the single currency in accordance with the treaty and in which a single monetary policy is conducted under the responsibility of the governing council of the European Central Bank.

Euro Feds: Eurodollars transmitted over the Fedwire instead of through CHIPS. Normally Euro Feds move from a foreign branch of one U.S. bank to a foreign branch of another U.S. bank; for example, from Citi Cayman to JPMorgan London. Foreign banks use CHIPS, not the Fedwire, to pay and receive Eurodollars because they may not run daylight overdrafts at the Fed.

Euro lines: Lines of credit granted by banks (foreign or foreign branches of U.S. banks) for Eurocurrencies.

Euro MTNs: An MTN issued in the Euromarket. See *MTNs*.

Eurobonds: Bonds issued in Europe outside the confines of any national capital market. A Eurobond may or may not be denominated in the currency of the issuer.

Eurocurrency deposits: Deposits made in a bank or bank branch that is not located in the country in whose currency the deposit is denominated. Dollars deposited in a London bank are *Eurodollars*; Japanese yen deposited there are *Euroyen*.

Eurodollar bundle: A Eurodollar bundle is the simultaneous purchase or sale of a consecutive series of Eurodollar futures in equal proportions beginning usually with the front quarterly contract. Bundles enable a strip of contracts to be traded in a single transaction.

Eurodollar CDs: CDs issued by a U.S. bank branch or foreign bank located outside the United States. Most Eurodollar CDs are issued in London.

Eurodollar pack: A consecutive series of four Eurodollar contracts. There are packs in each of the years that Eurodollar contracts exist, and they are given color code designations that coincide with the individual contracts.

Eurodollars: U.S. dollars deposited in a U.S. bank branch or a foreign bank located outside the United States.

Euronext: A cross-border exchange for trading cash securities and derivatives, providing international services for regulated cash markets and derivatives markets in Belgium, France, the United Kingdom (derivatives), the Netherlands, and Portugal.

European Central Bank (ECB): The EU body established in June 1, 1998, that is the center of the European System of Central Banks (ESCB) and the Eurosystem. Together with the national central banks of those EU member states that have adopted the euro, the ECB defines and implements the monetary policy for the euro area.

European currency unit (ECU): Prior to stage three of the European Monetary Union, the ECU was a basket currency made up of the sum of fixed amounts of 12 out of the 15 currencies of the EU member states. The value of the ECU was calculated as a weighted average of the value of its component currencies.

European option: An option that may be exercised only at expiration of the option.

Eurostat: The Statistical Office of the European Communities.

event risk: The risk that a corporate bond will be downgraded, perhaps severely, because of some unpredictable outside event, principally a leveraged buyout. Also refers to risks that could affect markets more generally.

excess reserves: Balances held by a bank at the Fed in excess of those required.

exchange rate: The price at which one currency trades for another.

exempt securities: Instruments exempt from the registration requirements of the Securities Act of 1933 or the margin requirements of the Securities and Exchange Act of 1934. Such securities include governments, agencies, municipal securities, commercial paper, and private placements.

exercise: To invoke the right to buy or sell granted under terms of a listed options contract.

exercise price: The price at which an option holder may buy or sell the underlying security. Also called the *striking price*.

extension swap: Extending maturity through a swap; for example, selling a 2-year note and buying one with a slightly longer current maturity.

fail: A trade is said to fail if on the settlement date either the seller fails to deliver securities in proper form or the buyer fails to deliver funds in proper form.

fed funds: See *federal funds*.

federal credit agencies: Agencies of the federal government set up to supply credit to various classes of institutions and individuals; for example, savings and loan associations, small businesses, students, farmers, farm cooperatives, and exporters.

Federal Deposit Insurance Corporation (FDIC): A federal institution created in 1933 that insures bank deposits and promotes confidence in the U.S. financial system. The FDIC insures deposits up to \$100,000 per depositor in each bank or thrift the FDIC insures. The FDIC generally provides separate coverage for retirement accounts, such as individual retirement accounts (IRAs) and Keoghs, insured up to \$250,000.

Federal Financing Bank: A federal institution that lends to a wide array of federal credit agencies funds it obtains by borrowing from the U.S. Treasury.

federal funds: (1) Non-interest-bearing deposits held by member banks at the Federal Reserve. (2) Used to denote “immediately available” funds in the clearing sense.

federal funds rate: The rate of interest at which fed funds are traded. This rate is currently pegged by the Federal Reserve through open market operations. The Fed transmits changes in its monetary policy primarily through the fed funds rate. It is the rate by which many other rates, such as the prime rate and Eurodollar rates, are based.

Federal Home Loan Banks (FHLB): The institutions that regulate and lend to savings and loan associations. The Federal Home Loan Banks play a role analogous to that played by the Federal Reserve Banks vis-à-vis member commercial banks.

Fedwire: An electronic payments system linking member banks to the Fed, used for making interbank payments of fed funds and for making deliveries of and payments for Treasury and agency securities. The Fed provides these services through its Fedwire Funds Service, the Fedwire Securities Service, and the National Settlements Service. The Fedwire Funds Service is a real-time gross settlement system that serves over 9,500 participants.

figuring the tail: Calculating the yield at which a future money market instrument (one available some period hence) is purchased when that future security is created by buying an existing instrument and financing the initial portion of life with a term repo.

firm: Refers to an order to buy or sell that can be executed without confirmation for some fixed period.

fixed dates: In the Eurodollar market the standard periods for which Eurodollars are traded (one month out to a year) are referred to as the fixed dates.

fixed-dollar security: A nonnegotiable debt security that can be redeemed at some fixed price or according to some schedule of fixed values (e.g., bank deposits and government savings bonds).

fixed-rate loan: A loan on which the rate paid by the borrower is fixed for the life of the loan.

flat trades: (1) A bond in default trades flat; that is, the price quoted covers both principal and unpaid accrued interest. (2) Any security that trades without accrued interest or at a price that includes accrued interest is said to trade flat.

flex repo: A repo for a variable (usually declining) sum done for some period, often several years.

float: The difference between the credits given by the Fed to banks' reserve accounts on checks being cleared through the Fed and the debits made to banks' reserve accounts on the same checks. Float is always positive, because in the clearing of a check, the credit sometimes precedes the debit. Float adds to the money supply.

floating-rate note: A note that pays an interest rate tied to current money market rates. The holder may have the right to demand redemption at par on specified dates.

floating supply: The amount of securities believed to be available for immediate purchase, that is, in the hands of dealers and investors wanting to sell.

floor: A series of options in which the writer guarantees the buyer, a receiver of floating, that he will pay the buyer whatever interest he loses if the rate he is receiving goes below an agreed rate, Y .

footings: A British expression for the bottom line of an institution's balance sheet; total assets equal total liabilities plus net worth.

foreign bond: A bond issued by a nondomestic borrower in the domestic capital market.

foreign-exchange forward: A contract in which the outright purchase or sale of one currency versus another is agreed on one day to be delivered at a specified future date, more than two working days after the date of the contract, at a given price.

foreign-exchange rate: The price at which one currency trades for another.

foreign-exchange risk: The risk that a long or short position in a foreign currency might, because of an adverse movement in the relevant exchange rate, have to be closed out at a loss. The long or short position may arise out of a financial or commercial transaction.

forward fed funds: Fed funds traded for future delivery.

forward forward contract: In Eurocurrencies, a contract under which a deposit of fixed maturity is agreed to at a fixed price for future delivery.

forward market: A market in which participants agree to trade some commodity, security, or foreign exchange at a fixed price at some future date.

forward rate: The rate at which forward transactions in some specific maturity are being made; for example, the dollar price at which yen can be bought for delivery three months hence.

FRA (forward rate agreement): Under a FRA, one party agrees to pay another some fixed rate for some defined period on a deposit, often for Eurodollar deposits, having an agreed notional sum. If the FRA were for the 4s–5s, the agreement would concern a 1-month rate to be paid four months hence. A FRA is settled at maturity via a cash payment, the amount and direction of which depends, *inter alia*, on the difference between the agreed forward rate and the prevailing market rate at the time of settlement.

FRABBA: The rate at which a FRA is to settle as established by the British Bankers Association.

free reserves: Excess reserves minus member bank borrowings at the Fed.

full-coupon bond: A bond with a coupon equal to the going market rate and consequently selling at or near par.

futures market: A market in which contracts for future delivery of a commodity or a security are bought and sold.

gamma of an option: The rate of change of the option's delta with respect to a change in the price of the underlier. Gamma measures the sensitivity of a delta-hedged position in an option against changes in the price of the underlier.

gap: Mismatch between the maturities of a bank's assets and liabilities.

gap trade: A market is said to gap trade when prices in it move discontinuously from range to range in response to announcements of economic numbers and other news.

gapping: Mismatching the maturities of a bank's assets and liabilities, usually by borrowing short and lending long.

general obligation bonds: Municipal securities secured by the issuer's pledge of its full faith, credit, and taxing power.

gilts: British Treasuries.

give-up: The loss in yield that occurs when a block of bonds is swapped for another block of lower coupon bonds. Can also be referred to as “after-tax give-up” when the implications of the profit (loss) on taxes are considered.

Glass-Steagall Act: A 1933 act in which Congress forbade commercial banks to own, underwrite, or deal in corporate stock and corporate bonds. The last remnants of Glass-Steagall were repealed with the enactment of the Gramm-Leach-Bliley Act of 1999.

go-around: When the Fed offers to buy securities, to sell securities, to do repo, or to do reverses, it solicits competitive bids or offers, as the case may be, from all primary dealers. This procedure is known as a *go-around*.

good delivery: A delivery in which everything—endorsement, any necessary attached legal papers, and so on—is in order.

good funds: A market expression for immediately available money, that is, fed funds.

good trader: A Treasury coupon issue that can readily be bought and sold in size. If a trader can short tens of millions of dollars of an issue and sleep at night, that issue is said to be a good trader.

governments: Generally refers to negotiable U.S. Treasury securities and to the debt obligations of other countries.

gross spread: The difference between the price that the issuer receives for its securities and the price that investors pay for them. This spread equals the selling concession plus the management and underwriting fees.

haircut: Margin in a repo transaction; that is, the difference between the actual market value measured at the bid side of the market and the value used in a repo agreement.

handle: The whole-dollar price of a bid or offer is referred to as the *handle*. For example, if a security is quoted 101-10 bid and 101-11 offered, 101 is the handle. Traders are assumed to know the handle, so a trader would quote that market to another by saying he was at 10-11. (The 10 and 11 refer to 32nds.)

hedge: To reduce risk, (1) by taking a position in futures equal and opposite to an existing or anticipated cash position, or (2) by shorting a security similar to one in which a long position has been established.

hit: A dealer who agrees to sell at the bid price quoted by another dealer is said to *hit* that bid.

IBFs (international banking facilities): Shell branches that U.S. banks in a number of states may form at the head office to do limited types of international business. IBFs allow depository institutions in the United States to offer services to foreign residents and institutions free of some Federal Reserve requirements and some state and local income taxes.

IMM (International Monetary Market): A futures exchange on the Chicago Mercantile Exchange.

IMM swap: A swap of 1-year fixed against 3-month LIBOR, where the 3-month rate floats. The start, end, and intermediate reset dates are set to coincide with the dates on four successive IMM contracts for 3-month Eurodollars.

implied volatility: A measure of expected volatility, determinable from options prices.

in the box: A dealer has a wire receipt for securities indicating that effective delivery on them has been made. This jargon is a holdover from the time when Treasuries took the form of physical securities and were stored in a rack.

in-the-money option: An option selling at a price such that it has intrinsic value.

indenture of a bond: A legal statement spelling out the obligations of the bond issuer and the rights of the bondholder.

indirect bidder: In a Treasury auction, indirect bidders include foreign central banks and official accounts that submit their bids through the Federal Reserve Bank of New York, as well as any customer who submits through a primary dealer.

inflation-index security: A fixed-income security whose cash flows and principal value are linked to an inflation index such as to a particular consumer price index.

interbank: When interbank refers to a rate, as in “British BAs trade at a spread to *interbank*,” the rate referred to is the interbank rate on Eurodollar time deposits.

interest-rate exposure: Risk of gain or loss to which an institution is exposed because of possible changes in interest-rate levels.

interest-rate swap: An exchange by borrowers or asset holders of interest-rate payments at two different rates (often one rate is fixed, the other floating). In a *basis swap*, both rates are floating.

international securities identification number (ISIN): An international identification code assigned to securities issued in financial markets.

investment banker: A firm that engages in the origination, underwriting, and distribution of new issues.

ISDA (International Swap Dealers Association): Chartered in 1985, the ISDA is the largest global financial trade association, by number of firms. It represents participants in the privately negotiated derivatives industry.

ISIN: See *international securities identification number*.

JGBs: Japanese government bonds.

joint account: An agreement between two or more firms to share risk and financing responsibility in purchasing or underwriting securities.

junk bonds: High-risk bonds that have low credit ratings or are in default. Also known as high-yield bonds.

leverage: See *debt leverage*.

leveraged lease: The lessor provides only a minor portion of the cost of the leased equipment, borrowing the rest from another lender.

LIBID (London interbank bid rate): The rate for Eurodollar time deposits of a given tenor.

LIBOR (London interbank offered rate): The rate on Eurodollar deposits traded between banks. There is a different LIBOR rate for each deposit maturity. Different banks may quote slightly different LIBOR rates because they use different reference banks. Much of worldwide funding is linked to LIBOR.

LIFFE (London International Financial Futures Exchange): A derivatives exchange acquired by Euronext in January 2002.

lifting a leg: Closing out one side of a long-short arbitrage before the other is closed.

LIMEAN: The mean of LIBOR and LIBID for Eurodollar deposits of a given tenor.

line of credit: An arrangement by which a bank agrees to lend to the line holder during some specified period any amount up to the full amount of the line.

liquidity: A liquid asset is one that can be converted easily and rapidly into cash without a substantial loss of value. In the money market, a security is said to be liquid if the spread between bid and asked prices is narrow and if reasonable size can be done at those quotes.

liquidity risk: In banking, risk that monies needed to fund assets may not be available in sufficient quantities at some future date. Implies an imbalance in committed maturities of assets and liabilities.

locked market: A market is said to be locked if the bid price equals the asked price. This can occur, for example, if the market is brokered and brokerage is paid by one side only, the initiator of the transaction.

lookup CDs: CDs that are issued with the tacit understanding that the buyer will not trade the certificate. Quite often, the issuing bank will insist that it keep the certificate to ensure that the understanding is honored by the buyer.

long: (1) Owning a debt security, stock, or other asset. (2) Owning more than one has contracted to deliver.

long bonds: Bonds with a long current maturity. Often a reference to 30-year U.S. Treasuries.

long coupons: (1) Bonds or notes with a long current maturity. (2) A bond on which one of the coupon periods, usually the first, is longer than the others or than standard.

long hedge: *Purchase of a futures contract to lock in the yield at which an anticipated cash inflow can be invested.*

maintenance period: The period over which compliance with reserve requirements is calculated.

make a market: A dealer is said to make a market when it quotes bid and offered prices at which it stands ready to buy and sell.

margin: (1) In a repo or a reverse repurchase transaction, the amount by which the market value of the securities collateralizing the transaction exceeds the amount lent. (2) In futures markets, money the buyers and sellers must put up to ensure performance on the contracts. (3) In options, similar meaning as in futures for sellers of put and call options.

marginal tax rate: The tax rate that would have to be paid on any additional dollars of taxable income earned.

market value: The price at which a security is trading and could presumably be purchased or sold.

marketability: A negotiable security is said to have good marketability if there is an active secondary market in which it can easily be resold.

match fund: A bank is said to match fund a loan or other asset when it does so by buying (taking) a deposit of the same maturity. The term is commonly used in the Eurodollar market.

matched book: If the distribution of the maturities of a bank's liabilities equals that of its assets, it is said to be running a matched book. The term is commonly used in the Eurodollar market.

medium-term notes (MTNs): Continuously offered notes that have any or all of the features of corporate bonds and that range in maturity from 8 months out to 30 years. Bank deposit notes are a form of MTN.

merchant bank: A British term for a bank that specializes not in lending out its own funds but in providing various financial services, such as accepting bills arising out of trade, underwriting new issues, and providing advice on acquisitions, mergers, foreign exchange, portfolio management, and so on.

mismatch: A mismatch between the interest-rate maturities of a bank's assets and liabilities. See also *gap* and *unmatched book*.

MM: Market abbreviation for million. Thus, 10MM means 10 million.

MOF: Japan's Ministry of Finance.

money market: The market in which short-term debt instruments (bills, commercial paper, etc.) with maturities generally up to one year are issued and traded.

money market (center) bank: A bank that is one of the nation's largest and consequently plays an active and important role in every sector of the money market.

money market fund: Mutual fund that primarily invests in money market instruments and/or other transferable debt instruments with a residual maturity of up to one year.

mortgage bond: Bond secured by a lien on property, equipment, or other real assets.

MTNs: See *medium-term notes*.

multicurrency clause: Such a clause on a Euro loan permits the borrower to switch from one currency to another on a rollover date.

municipal (muni) notes: Short-term notes issued by municipalities in anticipation of tax receipts, proceeds from a bond issue, or other revenues.

municipals: Securities issued by state and local governments and their agencies.

naked option position: An unhedged sale of a put or call option.

naked position: An unhedged long or short position.

nearby contract: Futures contract nearest to expiration.

negative carry: The net cost incurred when the cost of carry exceeds the yield on the securities being financed.

negotiable certificate of deposit: A large-denomination (generally \$1 million) CD that can be sold but cannot be cashed in before maturity.

negotiated sale: Situation in which the terms of an offering are determined by negotiation between the issuer and the underwriter rather than through competitive bidding by underwriting groups.

netting: An agreed offsetting of positions or obligations by trading partners or participants. Netting reduces the amount of transfers that take place between parties for both monies and securities.

new-issues market: The market in which a new issue of securities is first sold to investors.

new money: In a Treasury refunding, the amount by which the par value of the securities offered exceeds that of those maturing.

NIF (note issuance facility): A type of Eurodollar market bank line associated with the issuance of Eurodollar notes and Eurodollar commercial paper.

NOB (notes over bonds): Note-bonds spread in futures contract.

noncompetitive bid: In a Treasury auction, bidding for a specific amount of securities at the price, whatever it may turn out to be, equal to the average price of the accepted competitive bids.

note: Coupon issues with a relatively short original maturity are often called *notes*. *Muni notes*, however, have maturities ranging from a month to a year and pay interest only at maturity. *Treasury notes* are coupon securities that have an original maturity of up to 10 years.

NOW (negotiable order of withdrawal) accounts: These amount to checking accounts on which depository institutions (banks and thrifts) may pay a rate of interest subject to federal rate lids.

OATs (Obligations assimilables du Tresor): French Treasuries.

OCC: (1) *Options clearing corporation*, the issuer of all listed options trading on national options exchanges. (2) *Office of the Comptroller of the Currency*, a regulator of the U.S. banking industry.

odd lot: Less than a round lot.

OECD (Organization for Economic Cooperation and Development): The OECD groups roughly 30 member countries endeavoring to play a prominent role in fostering good governance in the public service and in corporate activity. The OECD produces internationally agreed instruments, decisions, and recommendations in areas where multilateral agreement is necessary.

off-the-run issue: In Treasuries and agencies, an issue that is not as actively traded as on-the-run, or current issues, which are the issues most recently sold.

offer: Price asked by a seller of securities.

one-man picture: The price quoted is said to be a one-man picture if both the bid and ask come from the same source.

one-sided (one-way) market: A market in which only one side, the bid or the asked, is quoted or firm.

open book: See *unmatched book*.

open repo: A repo with no definite term. The agreement is made on a day-to-day basis, and either the borrower or the lender may choose to terminate. The rate paid is higher than on overnight repo and is subject to adjustment if rates move.

opportunity cost: The cost of pursuing one course of action measured in terms of the foregone return offered by the most attractive alternative.

option: See *call* and *put*.

original maturity: Maturity at issue. For example, a 5-year note has an original maturity at issue of five years; one year later, it has a current maturity of four years.

out-of-the-money option: An option selling at a price such that it has no intrinsic value.

over-the-counter (OTC) market: Market created by dealer trading as opposed to the auction market prevailing on organized exchanges.

paper: Money market instruments, commercial paper, and other. Sometimes used interchangeably on Wall Street with cash instruments (as opposed to futures), including Treasuries.

paper gain (loss): Unrealized capital gain (loss) on securities held in a portfolio, based on a comparison of current market price and original cost.

par: (1) Price of 100%, commonly quoted as 100.0. (2) The principal amount at which the issuer of a debt security contracts to redeem that security at maturity, *face value*.

par bond: A bond selling at par.

parallel loan: An example of a parallel loan would be IBM agreeing to lend dollars to a sub of British Petroleum in exchange for British Petroleum lending pounds to an IBM British sub. Such agreements are struck only in rare instances when exchange controls in one or more countries prevent normal capital flows.

pass-through: A mortgage-backed security on which payment of interest and principal on the underlying mortgages is passed through to the security holder by an agent.

paydown: In a Treasury refunding, the amount by which the par value of the securities maturing exceeds that of those sold.

pay-up: (1) The loss of cash resulting from a swap into higher-price bonds. (2) The need (or willingness) of a bank or other borrower to pay a higher rate to get funds.

pickup: The gain in yield that occurs when a block of bonds is swapped for another block of higher-yielding bonds.

picture: The bid and asked prices quoted by a broker for a given security.

placement: A bank depositing Eurodollars with (or selling Eurodollars to) another bank is often said to be making a placement.

plus: Dealers in governments normally quote bids and offers in 32nds. To quote a bid or offer in 64ths, they use pluses; for example, a dealer who bids 4+ is bidding the handle plus $\frac{1}{2}$ + $\frac{1}{4}$ which equals the handle plus $\frac{3}{4}$.

point: (1) 100 bp = 1%. (2) One percent of the face value of a note or bond. (3) In the foreign-exchange market, the lowest level at which the currency is priced; for example, “1 point” is the difference between sterling prices of \$1.8080 and \$1.8081.

portfolio: Collection of securities held by an investor.

position: (1) To go long or short in a security. (2) The amount of securities owned (long position) or owed (short position).

positive carry: The net gain earned when the cost of carry is less than the yield on the securities being financed.

premium: (1) The amount by which the price at which an issue is trading exceeds the issue's par value. (2) The amount that must be paid in excess of par to call or refund an issue before maturity. (3) In money market parlance, the fact that a particular bank's CDs trade at a rate higher than others of its class, or that a bank has to pay up to acquire funds.

premium bond: Bond selling above par.

prepayment: A payment made ahead of the scheduled payment date. Used most frequently in the mortgage-backed securities market in reference to mortgages that are prepaid.

present value (of a future payment): The value today of a future payment discounted at an appropriate rate of interest.

presold issue: An issue that is sold out before the coupon announcement.

price risk: The risk that a debt security's price may change because of a rise or fall in the going level of interest rates.

prime rate: The rate at which banks lend to their best (prime) customers. The all-in cost of a bank loan to a prime credit equals the prime rate plus the cost of holding compensating balances. It is usually 3 percentage points above the fed funds rate.

principal: (1) The face amount or par value of a debt security. (2) One who acts as a dealer buying and selling for his own account.

private placement: An issue that is offered to a single or a few investors as opposed to being publicly offered. Private placements do not have to be registered with the SEC.

prospectus: A detailed statement prepared by an issuer and filed with the SEC prior to the sale of a new issue. The prospectus gives detailed information on the issue and on the issuer's condition and prospects.

put: An option that gives the holder the right to sell the underlying security at a specified price during a fixed time period.

range markets: Markets with lots of sideways motion.

RANs (revenue anticipation notes): Notes issued by states and municipalities to finance current expenditures in anticipation of the future receipt of nontax revenues.

rate risk: In banking, the risk that profits may decline or losses occur because a rise in interest rates forces up the cost of funding fixed-rate loans or other fixed-rate assets.

ratings: An evaluation given by Moody's, Standard & Poor's, Fitch, or other rating services of a security's creditworthiness.

real market: The bid and offer prices at which a dealer could do transactions in relatively large size. Quotes in the brokers market may reflect not the real market but pictures painted by dealers playing trading games.

real-time gross settlement (RTGS) system: A settlement system in which processing and settlement take place on an order-by-order basis (without netting) in real time (continuously).

“red” futures contract month: A futures contract in a month more than 12 months away; for example, in November, the Dec (pronounced Deess) Eurodollar contract would mature 1 month later; the red Dec contract, 13 months later.

red herring: A preliminary prospectus containing all the information required by the Securities and Exchange Commission except the offering price and coupon of a new issue.

refunding: Redemption of securities by funds raised through the sale of a new issue. The Treasury conducts these quarterly.

registered bond: A bond whose owner is registered with the issuer.

regular way settlement: In the money and bond markets, the regular basis on which some security trades are settled is that delivery of the securities purchased is made against payment in immediately available funds on the day following the transaction.

Regulation D: A regulation that sets uniform requirements for all depository institutions to maintain reserve balances either with their Federal Reserve Bank or as cash.

Regulation Q: Federal regulation imposing lids on the rates that banks may pay on savings and time deposits.

reinvestment rate: (1) The rate at which an investor assumes interest payments made on a debt security can be reinvested over the life of that security. (2) Also, the rate at which funds from a maturity or sale of a security can be reinvested. Often used in comparison to *give-up yield*.

relative value: The attractiveness—measured in terms of risk, liquidity, and return—of one instrument relative to another, or for a given instrument, of one maturity relative to another.

reopen an issue: The Treasury, when it wants to sell additional securities, will occasionally sell more of an existing issue (reopen it) rather than offer a new issue. Federal agencies also reopen issues.

repo: See *repurchase agreement*.

repurchase agreement (repo or RP): A holder of securities sells securities to an investor with an agreement to repurchase them at a fixed price on a fixed date. The security “buyer” in effect lends the “seller” money for the period of the agreement, and the terms of the agreement are structured to compensate him for this. Dealers use repo extensively to finance their positions. Exception: When the Fed is said to be doing repo, it is lending money; that is, it is increasing bank reserves.

reserve requirements: The percentages of different types of deposits that member banks are required to hold on deposit at the Fed.

retail: Individual and institutional customers as opposed to dealers and brokers. In the equity market, retail refers to small investors rather than institutional investors.

revenue bond: A municipal bond secured by revenue from tolls, user charges, or rents derived from the facility financed.

reverse: See *reverse repurchase agreement*.

reverse repurchase agreement: Most typically, a repurchase agreement initiated by the lender of funds. Reverses are used by dealers to borrow securities they have shorted. Exception: when the Fed is said to be doing reverses, it is borrowing money; that is, it is absorbing reserves.

revolving line of credit: A bank line of credit on which the customer pays a commitment fee and can take down and repay funds according to his needs. Normally the line involves a firm commitment from the bank for a period of several years.

rho of an option: The rate of change of the value of an option with respect to the risk-free rate of interest.

risk: Degree of uncertainty of return on an asset.

roll over: To reinvest funds received from a maturing security in a new issue of the same or a similar security.

rollover: Most term loans in the Eurodollar market are made on a rollover basis, which means that the loan is periodically repriced at an agreed-upon spread over the appropriate, currently prevailing LIBOR rate.

round lot: In the money market, *round lot* refers to the minimum amount for which dealers' quotes are good. This may range from \$100,000 to \$5 million, depending on the size and liquidity of the issue traded. In the Treasury market, a round lot is \$1 million.

RP: See *repurchase agreement*.

RUF: A revolving underwritten facility. A type of Euro line associated with the issuance of Euronotes and of Euro commercial paper.

run: A run consists of a series of bid and asked quotes for different securities or maturities. Dealers once gave and asked for runs from one another, a practice that is more common in the corporate and municipal markets than in other markets, where transparency has increased through the use of electronic systems, including the Internet.

S&L: See *savings and loan association*.

safekeep: For a fee, banks will safekeep (i.e., hold in their vault, clip coupons on, and present for payment at maturity) bonds and money market instruments.

sale repurchase agreement: See *repurchase agreement*.

savings and loan association: Federal- or state-chartered institution that accepts savings deposits and invests the bulk of the funds thus received in mortgages.

savings deposit: Interest-bearing deposit at a savings institution that has no specific maturity.

scale: A bank that offers to pay different rates of interest on CDs of varying maturities is said to “post a scale,” a reference to the different rates posted. Also, in an initial offering of a serial bond issue, scale represents the number of bonds, maturity dates, interest rates, and offering prices.

scalper: A speculator who actively trades a futures contract in the hope of making small profits off transitory upticks and downticks in price.

seasoned issue: An issue that has been well distributed and trades well in the secondary market.

secondary market: The market in which previously issued securities are traded.

sector: Refers to a group of securities that are similar with respect to maturity, type, rating, and/or coupon.

Securities and Exchange Commission (SEC): Agency created by Congress to protect investors in securities transactions by administering securities legislation.

sell a spread: Sell a nearby futures contract and buy a far one.

serial bonds: A bond issue in which maturities are staggered over a number of years.

settle: See *clear*.

settlement date: The date on which a trade is cleared by delivery of securities against funds. The settlement date may be the trade date or a later date.

shell branch: A foreign branch—usually in a tax haven—which engages in Eurodollar business but is run out of a head office.

shop: In Street jargon, a money market or bond dealership.

shopping: Seeking to obtain the best bid or offer available by calling a number of dealers and/or brokers.

short: A market participant assumes a short position by selling a security he does not own. The seller makes delivery by borrowing the security sold or reversing it in.

short bonds: Bonds with a short current maturity.

short book: See *unmatched book*.

short coupons: Bonds or notes with a short current maturity.

short hedge: Sale of a futures contract to hedge, for example, a position in cash securities or an anticipated borrowing need.

short sale: The sale of securities not owned by the seller in the expectation that the price of these securities will fall or as part of an arbitrage. A short sale must eventually be covered by a purchase of the securities sold.

short the board: The sale of Treasury futures on the CBOT.

sinking fund: Indentures on corporate issues often require that the issuer make annual payments to a sinking fund, the proceeds of which are used to retire randomly selected bonds in the issue.

size: Large in size, as in “size offering” or “in there for size.” What constitutes size varies with the sector of the market.

skip-day settlement: The trade is settled one business day beyond what is normal.

sovereign risk: The special risks, if any, that attach to a security (or deposit or loan) because the borrower's country of residence differs from that of the investor's. Also referred to as *country risk*.

specific issues market: The market in which dealers reverse in securities they want to short.

spectail: A dealer that does business with retail but concentrates more on acquiring and financing its own speculative position.

spot market: Market for immediate as opposed to future delivery. In the spot market for foreign exchange, settlement is two business days ahead.

spot rate: The price prevailing in the spot market.

spread: (1) Difference between bid and asked prices on a security. (2) Difference between yields on or prices of two securities of differing sorts or differing maturities. (3) In underwriting, difference between price realized by the issuer and price paid by the investor. (4) Difference between two prices or two rates. What a commodities trader would refer to as the *basis*.

spreading: In the futures market, buying one futures contract and selling a nearby one to profit from an anticipated narrowing or widening of the spread over time.

stop-out price: The lowest price (highest yield) accepted by the Treasury in an auction of a new issue.

striking price: See *exercise price*.

subject: Refers to a bid or offer that cannot be executed without confirmation from the customer. A bid or offer is "subject" (to change) until the customer agrees to the price.

subordinated debenture: The claims of holders of this issue rank after those of holders of various other unsecured debts incurred by the issuer.

sub right: Right of substitution—to change collateral—on a repo.

swap: (1) In securities, selling one issue and buying another. (2) In foreign exchange, buying a currency spot and simultaneously selling it forward.

swap rate: In the foreign-exchange market, the difference between the spot and forward rates at which a currency is traded.

swaption: An option on an interest-rate swap.

SWIFT (Society for Worldwide Interbank Financial Telecommunication): The cooperative organization created and owned by banks which operates a network to facilitate the exchange of payment and other financial messages between financial institutions throughout the world. A SWIFT payment message is an instruction to transfer funds, which is subsequently done over a payment system or through correspondent banking relationships.

swing line: See *demand line of credit*.

Swissy: Market jargon for Swiss francs.

switch: British English for a swap; that is, buying a currency spot and selling it forward.

tail: (1) The difference between the average price in Treasury auctions and the stop-out price. (2) A future money market instrument (one available some period hence) created by buying an existing instrument and financing the initial portion of its life with term repo.

take: (1) A dealer or customer who agrees to buy at another dealer's offered price is said to *take* that offer. (2) Eurodollar bankers speak of taking deposits rather than buying money.

take-out: (1) A cash surplus generated by the sale of one block of securities and the purchase of another, for example, selling a block of bonds at 99 and buying another block at 97. (2) A bid made to a seller of a security that is designed (and generally agreed) to take him out of the market.

taking a view: A London expression for forming an opinion concerning where interest rates are going and acting on it.

TANS: Tax anticipation notes issued by states or municipalities to finance current operations in anticipation of future tax receipts.

TARGET (Trans-European Automated Real-Time Gross settlement Express Transfer system): A payment system comprising 15 national real-time gross settlement systems (RTGS) and the European Central Bank (ECB) payment mechanism (EPM). The national RTGS systems and the EPM are interconnected by common procedures, so that TARGET gives access to almost 1,200 direct participants and more than 48,000 credit institutions (including branches and subs) for the real-time processing of cross-border transfers throughout the European Union.

technical condition of a market: Demand and supply factors affecting price, in particular the net position—long or short—of dealers and speculators.

technical: (1) Supply and demand factors influencing the cash market. (2) Value or shape of technical indicators.

TED: A spread trade: Treasuries versus Eurodollars.

tenor: Maturity.

term bonds: A bond issue in which all bonds mature at the same time.

term fed funds: Fed funds sold for a period of time longer than overnight.

term loan: Loan extended by a bank for more than the normal 90-day period. A term loan might run five years or more.

term repo (RP): Repo borrowings for a period longer than overnight; may be 30, 60, or even 90 days.

theta: In options pricing, the rate at which the value of an option changes as time passes.

thin market: A market in which trading volume is low and in which consequently bid and asked quotes are wide and the liquidity of the instrument traded is low.

TIBOR: LIBOR as established in Tokyo.

tick: Minimum price movement on a futures contract.

tight market: A tight market, as opposed to a thin market, is one in which volume is large, trading is active and highly competitive, and spreads between bid and ask prices are narrow.

time deposit: Interest-bearing deposit, at a savings institution, that has a specific maturity.

Tom next: In the interbank market in Eurodollar deposits and the foreign-exchange market, the value (delivery) date on a Tom next transaction is the next business day. (Refers to “tomorrow next.”)

trade date: The date on which a transaction is initiated. The settlement date may be the trade date or a later date.

trade on top of: Trade at a narrow or no spread in basis points to some other instrument.

treasurer’s check: A check issued by a bank to make a payment. Treasurer’s checks outstanding are counted as part of a bank’s reservable deposits and as part of the money supply.

Treasury bill: A non-interest-bearing discount security issued by the U.S. Treasury to finance the national debt. Regularly issued bills include 4-week, 3-month, and 6-month maturities. Also referred to as a *T-bill*.

TT&L account: Treasury tax and loan account at a bank.

turnaround: Securities bought and sold for settlement on the same day.

turnaround time: The time available or needed to effect a turnaround.

two-sided market: A market in which both bid and asked prices, good for the standard unit of trading, are quoted.

two-way market: Market in which both a bid and an asked price are quoted.

underlier: The thing against which an option is written. The underlier may be a stock, a bond, a futures contract, oil, land, whatever.

underwriter: A dealer who purchases new issues from the issuer and distributes them to investors. Underwriting is one function of an investment banker.

unmatched book: If the average maturity of a bank’s liabilities is less than that of its assets, it is said to be running an unmatched book. The term is commonly used in the Eurodollar market. Equivalent expressions are *open book* and *short book*.

value date: In the market for Eurodollar deposits and foreign exchange, value date refers to the delivery date of funds traded. Normally it is on spot transactions two days after a transaction is agreed upon and the future date in the case of a forward foreign-exchange trade.

variable-price security: A security, such as stocks and bonds, that sells at a fluctuating, market-determined price.

variable-rate CDs: Short-term CDs that pay interest periodically on roll dates; on each roll date the coupon on the CD is adjusted to reflect current market rates.

variable-rate loan: Loan made at an interest rate that fluctuates with the prime.

visible supply: New fixed-income issues scheduled to come to market within a short period of time, usually not more than 30 days.

when-issued trades: Typically there is a lag between the time a new bond is announced and sold and the time it is actually issued. During this interval, the security trades, WI, “when, as, and if issued.”

WI: When, as, and if issued. See *when-issued trades*.

without: If 90 were bid in the market and there was no offer, the quote would be “90 bid without.” The expression *without* indicates a one-way market.

write: To sell an option.

Yankee bond: A foreign bond issued in the U.S. market, payable in dollars, and registered with the SEC.

Yankee CD: A CD issued in the domestic market (typically in New York) by a branch of a foreign bank.

yield curve: A graph showing, for securities that all expose the investor to the same credit risk, the relationship at a given time between yield and current maturity. Yield curves are typically drawn using yields on governments of various maturities.

yield to maturity: The rate of return yielded by a debt security held to maturity when both interest payments and the investor’s capital gain or loss on the security are taken into account.

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